agriculture

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MONTHLY

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Agriculture

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Nigel Harvey summarizes the lessons of experience on this method of reducing costs by sharing equipment

Farm Machinery Syndicates

THE basic problem is old and familiar. So is the simplest method of dealing with it, for farmers have long been accustomed to lend and borrow implements on a generous scale. Some local studies, for instance, include maps showing the movements of loaned implements and the limits of accepted 'borrowing circles'. In the years after the war, however, the steadily increasing burden of investment in machinery inspired the development of the Farm Machinery Syndicate which continues in a new form this tradition of neighbourly co-operation.

Essentially, such a syndicate is a partnership, based on clearly specified rules, of two or more farmers which owns and runs a certain item, or certain items, of equipment. The first of these syndicates was established in Hampshire in 1955 and by 1968 their number had risen to 1,100. In the last four years some six hundred have been formed in England and Wales, owning between them machinery worth over £1,500,000 which ranges from grain

drying and storage plants and milling and mixing equipment via combines, balers, root-harvesters and drills to cement mixers and power saws.

For and against

In principle, the arguments in favour of this method of reducing individual investment and enabling machinery to be used to capacity are considerable, and the practical problems of forming syndicates are greatly reduced by the system which has been created to encourage and finance them*. On the other hand, there are obvious difficulties inherent in any such co-operation. The development of the movement shows that many farmers in many different areas with many different sizes and types of farm regard the balance of advantage as favourable. But the existence on a substantial scale of informal machinery-sharing arrangements outside the movement shows that many others do not.

Little systematic information is available on this informal machinery sharing. But the practice seems pretty widespread. Sometimes, it takes the form of the straightforward sharing of cost and use, sometimes of co-operation between relatives in buying machines for previously agreed periods of use on different holdings run by members of the same family, sometimes of 'cross purchase' in which two farmers buy a different machine each and exchange them when required, sometimes of the purchase of a machine by a farmer who has arranged to loan it to others at a set cost.

The reasons why these farmers prefer such arrangements to the syndicate system vary greatly. So do the reasons why others make no use of machinery sharing at all. But surveys have found three specific reasons why many are not convinced that the advantages of syndication outweigh its disadvantages. What are these reasons and what light does experience throw on them?

Machines for seasonal use

The first problem mentioned is the availability of machines for seasonal work. The savings to be secured by spreading the cost of specialized equipment required only for limited periods every year among as many farmers as is practicable are obvious. But will not everybody want the machine at once? The difficulty is real, but experience suggests that it is considerably less of a hazard than expected, provided, of course, that workload and membership have been properly assessed at the beginning. For certain types of seasonal machinery, for example, one report regarded a syndicate of four as maximum, two as optimum. Further, difficulties are sometimes reduced by the encouragement which the syndicate system gives to more general co-operation, so that members share labour and private equipment to provide balanced work teams which can move from farm to farm for particular jobs.

A number of syndicates have successfully operated such highly seasonal machinery as balers and combines for years and a detailed study of three silage machinery syndicates in Devon, where the climate has a painful habit of accentuating peak periods at silage-time, found that little difficulty arose in practice. Some syndicates prepare agreements on the order in which members can use machinery, but these are seldom invoked. The common sense of reasonable men working together generally prevails.

*For information and advice on the formation of Farm Machinery Syndicates, including details of the loans available, apply to the Secretary of the Syndicate Credit Company at your County N.F.U. Office.

Chop forage harvester in operation

Of course, sometimes machinery is not available when wanted and production suffers. In one survey, 27 per cent of the syndicate members questioned said that such losses occurred 'sometimes'. But none said that they occurred 'often' and some pointed out that such difficulties were not unknown on farms using their own equipment. More generally, the same survey showed that most members regarded this risk as a small price to set against the benefits received. Only 4 per cent of the farmers questioned found any difficulty in the working of their syndicate, and then only 'sometimes', while 58 per cent felt that membership had reduced the pressure on their labour force at peak times.

Machinery maintenance

The second is maintenance. We all know that everybody's business is nobody's business. The syndicates know it too and guard against its implications by allocating this responsibility in detail in their agreements. For example, they make one particular member primarily responsible for each machine's maintenance and repair. The other members inform him when the need arises and he makes the necessary arrangements and checks that the work has been done satisfactorily. When practicable, too, many syndicates specify that the operation and maintenance of the larger syndicated machines are the business of only one man whose skill is increased by this degree of specialization and whose sense of responsibility can be encouraged by a bonus system.

Further, the county Syndicate Credit Companies which administer the loans available require the periodical inspection of each machine by an independent qualified engineer, which sometimes brings the incidental benefit of better trade-in prices when the time comes. They also specify new machinery which reduces the maintenance problem and the breakdown hazard and also ensures that members get the benefit of both new developments and income tax allowances. Farmers accustomed to secondhand machinery prices should remember that investment in a share of a new machine may be no greater, and possibly more profitable, than investment in a privately-owned secondhand machine.

In practice, the danger of poor maintenance does not appear very great. Thus, a survey in 1964 found that 22 per cent of syndicate members felt that syndicate machines were 'sometimes' less well maintained, a further 7 per cent that they were 'often' less well maintained, than those they owned individually. This suggests that most syndicate machines were as well maintained, and some possibly better maintained, than those in individual hands. Even so, the investigator was right to conclude that 'the future success of the movement must in part depend on its establishing a reputation for standards of maintenance as high or even higher than those of individual farmers'. A later report commented that the very real concern of farmers on this issue may well bring its own solution. A problem realized is a problem already part-solved.

Suitable partners

The third is finding suitable partners. The importance of such partners is, of course, crucial in so close and intimate a business relationship and the task of the pioneer in finding, in a practicable radius, the right men with the right needs at the right time and stating the case for a syndicate convincingly can be considerable, particularly in areas where examples of syndication are few. But the difficulties can be over-emphasized, for the choice is fairly wide. The needs of farms with different systems can be complementary; so can those of large and small farms. Further, the number of members in many syndicates is small. Grain storage or ditching machine syndicates may have up to twenty members, but for many types of equipment two or three may be sufficient. In fact, the average size of a syndicate, excluding grain storage syndicates, is between two and three members. So in most cases the number of partners required is small.

Advantage and conviction

A generation ago, the impossibility of such co-operation was a familiar maxim of conventional wisdom. Today, machinery syndicates are an accepted part of the farming system and fifteen years of experience have shown their value to those who join them. Obviously, they reduce capital costs substantially. They also offer a source of credit not open to those who are not members of syndicates on terms which commonly compare favourably with those available to individual borrowers. Less obviously, they provide an introduction to further forms of mutual assistance. The importance of the development of such co-operation between farmers surely needs no emphasis nowadays.

Experience has also shown that the apparent disadvantages of the system are not so considerable as they appear at first sight and that they can be minimized by care and common sense. Clearly, syndicates are both practicable and profitable. Equally clearly, the future of the movement depends on the conviction that they are practicable and profitable. Where this conviction is strong, syndicates spread. Where it is weak, they increase at best slowly. In other words, the movement depends on farmers convincing their neighbours of its value. The moral of the story is obvious.

Nigel Harvey, M.A., Q.A.L.A.S., was on the staff of the Ministry from 1946 to 1958 and of the Agricultural Research Council from 1958 to 1969. He is now a member of the Environmental Pollution Unit of the Secretary of State for Local Government and Regional Planning.

The high specifications for vegetable quality which are made by the pre-packing industry will eventually benefit the grower. This article discusses the recent developments in

Vegetable Varieties

K. E. Haine

Economic effect of increased costs of seed production

PLANT breeding is being concentrated in fields which are likely to show the highest return for capital invested. The greatest activity is in crops such as peas, dwarf French beans, Brussels sprouts and carrots where a suitable variety may be taken up by a processing company with the prospects of relatively large quantities of seed being required.

The breeding of varieties that are adapted for use in a comparatively small climatic area or for other limited uses are likely to be given a lower priority in a plant breeding programme. Unless a variety has a potential sale in large quantities it is unlikely to be an economic proposition to produce it. The small seed merchant catering for a local area only is rapidly going out of business or is being taken over and absorbed into the large national or international businesses.

Effects of the processing industry on vegetable varieties

In general, the main emphasis in specifications for vegetables for canning and freezing is on small size, high quality and uniformity. In many vegetables, a series of varieties is required to give a succession of maturity to enable the factory to operate with an even flow of input over a long period. With peas, Kelvedon Wonder and Dark Skinned Perfection used to be the main dark seeded varieties used for processing. Now varieties such as Orfac, Sparkle and Sprite are available to give earlier harvesting than Kelvedon Wonder, whilst Multifreezer can extend the season beyond that of Dark Skinned Perfection. Similarly, with dwarf French beans there are earlier varieties, e.g., Glamis and later varieties, e.g., Bush Blue Lake and Cascade which can be used in conjunction with a midseason variety such as Tendercrop White Seeded to give a succession of harvest extending over several weeks from one sowing.

At one time it was thought that special varieties of carrots and Brussels sprouts would be required to produce the small carrot roots and Brussels sprout buttons for canning and freezing. Recent experimental work has shown that plant spacing may be more important than variety in this respect. Variety trials with Brussels sprouts have indicated that the larger sprouted varieties such as No. 10, Champion, Roem van Kloosterburen, Stiekema, etc., can give high yields of $\frac{3}{4}$—$1\frac{1}{8}$ in. buttons if the plant spacing is reduced

A selection of Avon Coronet

to 18–24 in. In view of this, it is expected that plant breeders will concentrate attention now on F.1 hybrids with medium to large sprouts which will be suitable for both fresh market and for processing. Favourable comment has already been made by both market growers and processors on Indra, Peer Gynt, Topscore, Topgrade, Unigrade and others which are of this type. The same general principle of regulation of size by means of spacing seems to apply to the various groups of carrots. High-density sowing of Amsterdam types can produce 'finger' carrots. Small, medium and large Chantenay, Berlikum or Autumn King carrots can be achieved by suitable seed rates. The improvements of carrot varieties has been largely concerned with uniformity of shape and the introduction of red core colour, improved skin finish and freedom from defects. Whilst some new names have been given to improved stocks, growers are likely to be more interested in obtaining a good stock of Amsterdam, Nantes, Berlikum, Chantenay or Autumn King than with trying out a new named variety.

Varieties for pre-packaging

In addition to high quality standards, vegetables for prepacking must have a neat compact shape and present an attractive appearance when seen through plastic or film. From the many lettuce varieties, only the Hilde varieties are generally acceptable by supermarkets with the possible additions of Cobham Green (when a darker colour is preferred) or Avondefiance (where resistance to downy mildew is required later in the summer). For beetroot, the spherical shape is essential for a neat pack and this excludes all varieties having flat, long or mixed shapes. Avonearly, Boltardy and Detroit Improved Globe are popular as non-bolting varieties for early sowing. Parsnips must be disease free as well as being well shaped. Avonresister has a high degree of resistance to 'canker', but the Improved Marrow and Lisbonnais varieties appear more attractive in a plastic bag and seed merchants are selecting canker-resistant parsnips of this type. Celery is another crop in which great attention is being devoted to producing 'sticks' that

are easy to pack into a plastic sleeve and which appear appetising. New Dwarf White is attracting attention as having a more upright habit of growth and a smoother (less corrugated) appearance. Good flavour is specified in some supermarket contracts and Avon Pearl has been given superior ratings by variety trial tasting panels. The American green varieties, such as Compak, F.M.D.5 and Greensleeves, also have good flavour, but the green colour is not always acceptable to the British housewife.

Many of our present cabbage varieties do not make attractive prepacks. For early-hearted spring cabbage, a variety such as April is probably the best for colour and shape. For later-hearted cabbage Wheelers Imperial and compact forms of Offenham may make good packs. Earliana, Copenhagen Market and Primo types are acceptable for round-headed cabbage in summer but as the season progresses, the darker green varieties such as the Christmas Drumhead are becoming more popular than the 'autumn' varieties. The red tinged leaf of January King is still popular and seed merchants are advertising small headed, compact selections which are suitable for prepacking. The consumption of white 'storage' cabbage of the Dutch Langendijker or Danish Amager type has increased considerably with the introduction of white cabbage for sale in multiple stores. Growers have found it possible to grow satisfactory crops of this type of cabbage in this country.

Cauliflowers are possibly the most unsatisfactory vegetable for prepacking at the present time in that very few varieties produce sufficient proportions of uniform heads. Some early summer cauliflowers, e.g., Delta, Dominant, Snowball and others and some spring heading cauliflowers, e.g., Armado, Markanta, May Glory, Mayfare, Apex and others may give 50 per cent or more of heads which are graded as Extra or Class 1 but even so, there is considerable variation in shape, colour and texture. F.1 hybrids may ultimately improve the position, but at present the only hybrids available are from Japanese plant breeders (Snow King and Snow Queen) and, whilst they have uniformity, they have not proved to be adapted for growing in this country.

Mechanization

Plant breeders who have spent perhaps ten or even twenty years working on a new variety may experience bitter disappointment when some new machine which causes a rejection of this variety is invented. One of the earlier essential requirements of Brussels sprouts was easy picking, but the harvesting machinery which is being introduced now may require hard picking varieties e.g., Jade Cross, so that the buttons are not broken off in the elevator. A dwarf French bean variety, which appeared very promising in most respects does not 'snib' satisfactorily and may have to be rejected unless the machinery can be adapted to cope with it. With onions, a round shape is necessary for easy progress through harvesting, grading and packing machines. This includes the English variety Best of All but excludes many favourite varieties such as James Keeping, Exhibition and Rousham Park Hero. Rijnsburger, and named varieties of this type, have superseded almost all other varieties for commercial growing at the present time. The effect of machinery on the choice of variety in cauliflowers has been the selection of an upright habit of leaf growth which permits tractors to pass between the rows without too much damage. If, however, a 'once over' harvest is adopted, less leaf and a more spreading habit may be required.

Market growers and home gardeners may feel that their needs are being neglected. This may be true, but unless the seed merchants can expect very much higher prices to be paid by these customers, it is unlikely that special seed stocks can be maintained or developed for them. Perhaps a partial solution may be an endeavour to make the best use of the varieties that are available by making changes in culture to suit the new varieties. Brussels sprouts may need to be grown at close spacing with high rates of fertilizer and harvested on the stalk. If varieties of peas such as Senator, Onward, Alderman, etc., are not procurable, it will be necessary to grow varieties like Dark Skinned Perfection, Jade, Multifreezer, etc., using the techniques employed by those who grow these varieties for the processing industry. For other vegetable crops, the high specifications for quality which are made by the prepacking industry may eventually benefit the market grower and home gardener. It has become necessary for plant breeders and seed merchants to recognize the need for high quality and uniformity and, although the number of varieties listed in the catalogues is reduced, the quality of those that remain should be improved.

This article has been contributed by **K. E. Haine, B.Sc.(Agric.),London,** who has been with the National Institute of Agricultural Botany, Cambridge, since 1949. During the period 1949–1964 he was with the N.I.A.B. Regional Centres at Seale-Hayne, Devon, and Cambourne, Cornwall, where he took a special interest in the improvement of varieties and seed production of winter cauliflowers.

Council of Fellows of Royal Agricultural Societies

New Qualifications for Talented and Outstanding Agriculturists

The Royal Agricultural Society of England, The Royal Highland and Agricultural Society of Scotland and The Royal Welsh Agricultural Society have instituted jointly a distinctive senior award in agriculture. This takes the form of an Associateship leading to Fellowship of Royal Agricultural Societies, to be distinguished shortly by the letters A.R.Ag.S. and F.R.Ag.S. respectively.

Objective

The purpose of the award is the creation of a high calibre qualification, linking practice with science, for talented and outstanding agriculturists (men or women) who, though they may already have a recognized qualification, wish to have a professional seal set on their achievement. As well as enhancing the prestige of the holders, the award must prove to be of continuing value in the industry during the most active part of their working lives. The scheme is designed for those whose work comes within the technological, managerial, business and commercial and administrative fields of agriculture interpreted in the widest sense to include the ancillary industries; also for those in the advisory and educational services.

Application for admission

The scheme is being launched on 1st April, 1970, and copies of the Conditions of Award and of the Form of Application for admission to the Associateship scheme may be obtained from the Secretary, Council of Fellows of Royal Agricultural Societies, 35 Belgrave Square, London, S.W.1.

Hop powders and extracts prepared from seeded hops should, if offered at a competitive price, be acceptable on the World markets. F. C. Thompson, M.Sc., Deputy Head of the Department of Hop Research, Wye College, discusses recent changes in English hop growing

Hop Growing

F. C. Thompson

THE cultivated hop, *Humulus lupulus* (*L*), is a climbing herbaceous perennial plant. The hop stems (bines) and other aerial parts die in the autumn, but the roots live for many years and new shoot growth arises each spring from the fleshy crown or rootstock, just below the soil surface. The plant is dioecious and the hop of commerce is the female inflorescence or cone. In England a few males are deliberately planted amongst the females to produce seeded cones, whereas in most other countries hops are grown seedless.

Hop production must be tailored to the needs of the brewer—the sole customer for the crop. In recent years, the brewing industry has passed through a period of amalgamation into larger, and more cost-conscious, units and there is greater emphasis on the better utilization of raw materials. Hops are used to give the characteristic bitter flavour to beer, the bittering principles being contained in the yellow resinous powder, lupulin, found in the cones. These bittering compounds are loosely referred to as resins, the most important group being the alpha acids. At the present time there is a decline in demand for hops of traditional delicate aroma, but low in resins, and an increasing preference for hops of high resin content with less emphasis on aroma, particularly where the hops are used for extract production rather than for direct addition to the work. What, in fact, the brewer increasingly demands is maximum resin production at minimum cost. To meet this need growers are continually modifying traditional practices and adopting new techniques.

Varieties

One way is to grow improved varieties. The late Professor Salmon anticipated the need for high resin types, but the kinds he bred found little favour with brewers in his lifetime. Today his Wye varieties, Bullion and Northern Brewer, are in increasing demand and growers are encouraged to expand their acreage. Both varieties, however, are wilt-sensitive and so restricted to non-wilt areas, where growers compare them unfavourably with the old variety Fuggle because of their greater susceptibility to mildews. To overcome this, mildew-resistant varieties, of Northern Brewer type, have been bred at Wye and are coming into commercial production.

Diseases and pests

The main fungus diseases of economic importance are downy mildew, powdery mildew and *Verticillium* wilt. The mildews can be controlled by hygiene measures and fungicides, but control is costly in materials and labour, so the introduction of mildew-resistant varieties will result in worthwhile savings.

Wilt is a major problem, particularly in the Weald of Kent where nearly a third of the hop acreage is located. This soil-borne disease cannot be controlled by fungicides and is lethal to all the old commercial varieties. Hop production would have ceased in the badly infected areas had the resistant varieties not been introduced. Those first tried proved unpopular with brewers, but the present range—W.G.V., Bramling Cross and Progress—are generally acceptable as Fuggle replacements and now comprise over 25 per cent of the hop acreage.

Virus diseases continue to take their toll, but knowledge of their nature and spread has been greatly extended by workers at East Malling Research Station. In the field, the position has improved with the large scale planting of material produced by specialist propagators to the requirements of the Ministry of Agriculture A plus health certificate.

The most important hop pest is the damson-hop aphid. Prior to 1950, nicotine and derris were the only insecticides available against this pest and control was often difficult. That year saw the introduction of systemic organophosphorus insecticides which proved very effective against hop aphid and rapidly came into general use, control being no problem for several years. In the last six years, however, many growers have experienced increasing difficulty in obtaining satisfactory aphid control and the existence of strains resistant to organophosphorus insecticides has been proved. To meet this problem new insecticides of the carbamamate type are now being tested.

Husbandry

To achieve the standard of hop culture once thought desirable requires much hand labour. With the growing shortage and cost of labour the value of many traditional practices is being increasingly questioned. Hand digging and frequent cultivations are largely things of the past and chemical weed control is now widely practised. With the introduction of herbicides many growers have gone further and adopted a no-cultivation technique based on simazine and paraquat. Hops in trial plots at Wye College, maintained under this system for seven years, have shown no harmful effects, and there is good evidence that the lack of root disturbance enhances crop yield.

In the past, hop manuring was often both haphazard and excessive, involving a range of organic waste materials. In recent years a more rational approach has been adopted and a simpler manurial programme, mainly based on inorganic fertilizers, is now generally used. Whether this can be further simplified under no-cultivation has yet to be determined, but it is likely that the absence of root disturbance should enable the plant to utilize soil nutrients more efficiently. Undoubtedly no-cultivation should reduce the need for regular heavy applications of bulky organic manures, which under arable cultivation are essential to maintain structure on most hop soils.

Training and wirework

Hops are grown up coir string attached to permanent overhead wirework. Traditional practice is to train the bines by hand in the initial stages of growth, selecting two or three bines per string, the strength and type of bine being carefully chosen. Surplus bines are subsequently pulled out by hand and the lower leaves stripped from the trained bines. The trend now is to simplify this time-consuming operation by allowing the bines to self-train and restricting handwork to furnishing empty strings. Although this leads to a less even distribution of bines of varying strength, trials have shown that it need not result in loss of crop. Handwork is then further reduced by using chemical defoliants to remove surplus shoots and unwanted basal growth, and later for leaf stripping.

Modifications in hop wirework systems have followed the introduction of machine-picking. Trials have shown that the type of growth most suitable for the machine is encouraged by raising the height above the 12 ft customary in the days of hand-picking, and 16 ft wirework is now common. Much higher wirework (21—25 ft) has long been used on the Continent and is now being tested in this country, but its advantages, if any, have yet to be proved. More recently a number of low pole-density systems have been developed on the Continent, and these offer possibilities for the further mechanization of growing and harvesting the crop. A system of this type, developed at Wye, is now under trial.

Picking and drying

The colourful scene associated with hand-picking is now a thing of the past as virtually the entire crop is machine-picked, and has been for several years. With the changed social conditions following the second World War, labour for picking soon became scarce and by 1950 a few machines, based on American designs, were in operation. The next decade saw a rapid expansion, the proportion of the crop picked by machine rising from under five per cent to 75 per cent by 1960, and reaching 90 per cent by 1963. Initially, various types of machine, both stationary and mobile, were tried out but a standard pattern of stationary machine is now universal. The hop bines are cut down in the field and transported to the machine which ideally should be sited adjacent to the drying plant. The bines pass through rotating drums to which wire-loop fingers are attached. These pluck the leaves and cones from the bines and a series of cleaning devices then sorts the cones from the leaf waste. There have been no major developments in machine design in recent years, but there have been significant improvements in detail, particularly in the cleaning process. Samples can now be produced comparable to hand-picking in level of extraneous matter, with considerable economies in labour.

After picking, hops are dried in oasts to about ten per cent moisture for safe storage. The attractive traditional oast house with its tall round kiln, surmounted by a white-painted cowl, was designed to ensure uniform airflow with coal fires and natural draught. Nowadays, oil-fired furnaces are used incorporating fans to blow the warm air through the hops, and there is no need for kilns of the old design. New oasts, in fact, tend to be housed in general-purpose buildings, although in the majority the principle of batch drying is still retained. An alternative system is continuous belt drying, which

was tried in England some years ago with little success. Recently, however, a continuous drier of German design was installed in this country and has given satisfactory results. Unfortunately, such installations are very costly, and can only be justified on very large hop farms or as central drying units in a co-operative organization.

The appearance of the dried hops still plays an important part in market valuation, though some of the criteria adopted have little significance in brewing. The shortage of experienced driers, skilled in the art of achieving traditional market standards, has forced a more scientific approach to the drying process. Accurate control of temperature and air speed has been simplified by instrumentation, and the use of differential thermometers, placed above and below the hop bed, aids the assessment of the very critical end-point of drying.

Marketing and future developments

Hops are sold on a quota system operated by the Hops Marketing Board, which ensures a fair return to the grower, based on cost of production, while protecting the brewer from the gross fluctuations in price which can occur on a free market. This system, however, can encourage over-production and with the fall in demand resulting from economies in hop usage, the Hops Marketing Board is concerned to reduce acreage and has succeeded in eliminating some 2,500 acres, in the last two years, by buying quota from producers prepared to abandon hop growing.

Nevertheless, the increasing preference for high resin hops is bound to lead to a further fall in demand and consequent reduction in acreage, and the industry's problem is to find ways to limit this as far as possible. The development of an export trade is one possibility, as beer production is increasing throughout the world, but in most countries brewers prefer seedless hops and English seeded hops are unpopular.

Paradoxically, the urge for greater efficiency in hop utilization may benefit the English grower indirectly, since it has led to the production of hop powders and extracts which offer a number of advantages over whole hops in brewing. Such products can be prepared from English seeded hops and should be acceptable on the world market if offered at a competitive price, so providing an avenue for expansion to offset a contracting home market. The challenge is to achieve a competitive price, but it is one that the English grower, willing to adopt new techniques, should be well placed to meet.

Further reading

Hop Growing and Drying. Bull. 164. 2nd edition, 1968. 11*s*. (by post 11*s*. 8*d*.) Discusses varieties, propagation, soils and climate, their establishment and the year's work in a hop garden, nutrition, diseases and pests and the picking, processing and marketing of the crop. Illustrated. (88 pp.) obtainable from H.M.S.O. (*addresses on p. 198*).

Symbol for British industry's metric change

J. B. Freeland of the A.L.S., recommends that everyone should now understand what the change-over to metric will entail, and how to use SI Units. He has, therefore, entitled it

Half-way to Metric

'It's later than you think' is the title of a film on metrication and dimensional co-ordination, it is also an apt phrase for opening this article, because there are far too many people who are still unaware of the fact that the United Kingdom has already reached the half-way mark in the programme for industry to adopt the SI metric system, which is to be completed by 1975.

The past five years has been a period of planning and administration for the major industries, and agriculture is inevitably affected by their programmes, some of which have now been published. In particular, those for the construction industry 1966–1972, the engineering industry 1967–1975 and the electrical industry 1968–1976. It is worth noting that the specific completion dates for achieving the change-over in these industries do not in all cases coincide, so that during the initial transition period it is inevitable that difficulties will be experienced with industries, thus impeding the progress of each other.

With the adoption of the Systeme Internationale d'Unités (SI units) there are many problems arising from the correct selection of sub-units and their proper annotation etc., which are best suited to particular industries and also to specific sectors within those industries. These problems and the difficulties being experienced by some industries who have yet to publish their programmes for changing over, has resulted in the Government setting up the Metrication Board.

The Metrication Board was set up in May, 1969 with the specific duty of stimulating and co-ordinating the planning for the transition of the various sectors of the economy. This is being carried out through a number of steering committees, one of which caters for agriculture, horticulture, fisheries, forestry and land including land use planning. This steering committee is inquiring into the state of preparedness for the change-over within the many sectors of the industry, and into the most satisfactory organizations best able to undertake the general oversight of the change-over arrangements.

Many problems within the agricultural sector have already been identified and cover such items as the correct units to be selected, the programme for reforming legislation, planning within the Ordnance Survey, and the need for education and training in metrication within the industry. It is accepted that the first priority is the need for a timetable for the change-over within the different sectors of the industry.

Due to the complex nature of the agricultural industry and the vast number of different interests, the National Farmers Union has established a metrication group which is undertaking co-ordination of these sectors, including the identification of their specific problems, relating to both the metric units most suitable to their needs and also the time for the change-over to metric. The outcome of the metrication groups' recommendations will no doubt be the publication of the programme for the change within the industry. The exact time of this change is not yet known, but it will obviously be after decimalization which becomes operative on 15th February, 1971 and could well be two or three years hence in many sectors.

It must not be forgotten, however, that agriculture is already affected by the construction industry programme, which has scheduled that building works commencing from January, 1970 should be to metric dimensions. Members of the industry will also find that many commodities will soon only be available in metric capacities, typical of these being cement which from January, 1971 will be delivered in 50 kilogramme bags or in metric tonnes. Similarly, after March, 1970 all softwood timber will be sold to metric dimensions; by the lineal metre instead of the lineal foot, by cross sections in millimetres instead of inches, by the square metre instead of the square foot and by cubic metres instead of standards (see diagram on page 164).

The transition period of the change-over will produce problems within every industry as components of metric dimensions are manufactured and gradually replace those of existing dimensions. The construction industry will have its own particular difficulties during this period arising from the rate of production of components which have been manufactured to a dimensionally co-ordinated pattern. At the present time, with construction works having started in January this year to metric dimensions, few components are yet being manufactured to co-ordinated sizes. We will, therefore, find the industry experiencing a dual change within its programme, in the first instance the adoption of metric units of measurement, and secondly, the increased use of components which have been co-ordinated dimensionally.

It will be seen that to date the most changes are taking place within the major industries, but their effects are being experienced throughout all sections of the community. One of the non-industrial sectors to publish their change-over plans has been the Ordnance Survey, who for logistical reasons are not in a position to complete their change-over within the ten year period demanded by the Government. Since November, 1969 the new 1:2500 scale sheets, which are extensively used by farmers, have had their parcel numbers shown in both acres and hectares. Contours and other height measurements together with mererings are, however, given solely in metric units. The 1:1250 scale sheets are also being changed and the six-inch sheet (1:10560) is being gradually replaced by a new scale 1:10000.

There may, therefore, be a period of several years before the agricultural industry itself has completely adopted metric units of measurements. In no way does this suggest that members of the industry can shelve the problems

of metrication until it takes place. Whilst it may be frustrating to have to wait, there are advantages in that the identical problems now being experienced within other industries will have been settled, the time can be well spent in a detailed study of the six basic SI units, the units tqat are derived from them and their multiples and sub-multiples. The bad annotation of metric units and their symbols which is evident in publications generally stresses the need for a full understanding of the SI system by everyone.

SI Base Units

Quantity	*Unit*	*Unit symbol*
length	metre	m
mass	kilogramme	kg
time	second	s
electric current	ampere	A
*temperature (thermodynamic)	kelvin	K
luminous intensity	candela	cd

*Note—The units of kelvin and Celsius temperature interval are identical. A temperature expressed in degrees Celsius is equal to the temperature expressed in kelvin less 273·15.

Derived SI units with special names

Quantity	*Unit*	*Symbol*	*Derivation*
force	newton	N	1 N = 1 kg m/s²
work, energy, quantity of heat	joule	J	1 J = 1 Nm
power	watt	W	1 W = 1 J/s
electrical potential	volt	V	1 V = 1 W/A
frequency (cycles per second)	hertz	Hz	1 Hz = 1 c/s
luminous flux	lumen	lm	1 lm = 1 cd sr}
illumination	lux	lx	1 lx = 1 lm/m²

Some other derived SI units which are expressed in terms of the units from which they are derived

Quantity	*Unit*	*Symbol*
area	square metre	m²
volume	cubic metre	m³
density	kilogramme per cubic metre	kg/m³
velocity	metre per second	m/s
acceleration	metre per second second	m/s²
pressure, stress	newton per square metre	N/m²
thermal conductivity	watt per metre degree Celsius	W/m °C
luminance	candela per square metre	cd/m²
co-efficient of heat transfer	watt per square metre degree Celsius	W/m² °C

Decimal multiples and sub-multiples of the SI units are formed by means of prefixes, the most common of these are:

Multiple units		*Prefix*	*Example*
10^1	tens	deca	*deca*metre
10^2	hundreds	hecto	*hecto*are
10^3	thousands	kilo	*kilo*gramme
10^6	millions	mega	*mega*watt
Sub-multiple units		*Prefix*	*Example*
10^{-1}	tenths	deci	*deci*metre
10^{-2}	hundredths	centi	*centi*metre
10^{-3}	thousandths	milli	*milli*gramme
10^{-6}	millionths	micro	*micro*metre

Regardless of the degree to which different people will become involved, it is essential that everyone should now be aware of what the change-over to metric entails, and should have an understanding of the units together with the ability to think metric.

Timber Goes Metric from 1st April, 1970

By the **Lineal Metre (m)** instead of the Lineal Foot
By Cross Sections in **Millimetres (mm)** instead of inches
By the **Square Metre (m^2 or sq m)** instead of the Square Foot
By **Cubic Metres (m^3 or cu m)** instead of standards

These will be the new sizes of sawn softwood:

THICKNESS IN mm	75	100	125	150	175	200	225	250	300
16	●	●	●	●					
19	●	●	●	●					
22	●	●	●	●					
25	●	●	●	●	●	●	●	●	●
32	●	●	●	●	●	●	●	●	●
38	●	●	●	●	●	●	●		
44	●	●	●	●	●	●	●	●	●
50	●	●	●	●	●	●	●	●	●
63		●	●	●	●	●	●		
75		●	●	●	●	●	●	●	●
100		●		●		●		●	●
150				●		●			●
200						●			
250								●	
300									●

All the dimensions are based on 1 inch = 25 mm and this will be the basis used to convert imperial measure into metric after 1st April 1970

Thickness. Most of the new sizes are only slightly smaller than the existing ones. For example, 16 mm is slightly less than 5/8 in.

Lengths. Softwood will be available in lengths beginning at 1·8 m, increasing by increments of 300 mm.

The new metric lengths will be shorter than existing lengths in feet. Although 300 mm is near to one foot it is slightly smaller. For example, 1·8 m will equal 5 ft 10$\frac{7}{8}$ in. *not* 6 ft, and 3·6 m will equal 11 ft 9$\frac{3}{4}$ in. *not* 12 ft.

K. B. C. Jones *of the Agricultural Land Service talks about*

Farm Waste Disposal—

Amenity and good Neighbourliness

The general picture

A WASTE is any product for which its owner has no further use. It may have residual or reclamation value, but the individual or business producing the waste does not consider the process viable or desirable. Wastes are produced not only by animals in and around farm buildings, but also result from non-agricultural enjoyment of the countryside. Motorists abandon cars and picnic litter, engines emit noise and noxious gases, and farmers have plastic sacks, metal containers and old engine oils and waste in other forms that are difficult to dispose of without special facilities. The whole problem is aggravated by the trend away from returnable containers and the increasing use of packaging materials that are made of non-degradable products. Timber and hessian sacks can be burnt or used again to good purpose but plastic is inert. The increasing mobility of people has also meant that rubbish can be dumped well away from objecting neighbours and there is little chance of offenders being caught and convicted. The law has largely to reply on the individual sense of responsibility of the public, and the education of people to higher standards of behaviour. Farmers, for their part, must accept a greater sharing of the countryside with city dwellers and must demonstrate their tidyness and good waste management to people who normally have a municipal refuse organization to keep their cities clean.

Traditionally, animals were reared and fattened by grazing in fields. Poultry were kept on free range, and the size of any livestock enterprise on a farm was related to its acreage. Pesticides, insecticides and antibiotics were unheard of and few problems arose. There may have been a few country smells but these were of short duration and understood by the rural community. Severe water pollution was rare because silage was not made, and artificial fertilizers were either spread sparingly or not at all. Perhaps most important of all, was that the limited demand for fresh water could easily be met from uncontaminated springs, boreholes or rivers. Recent economic and labour pressures have forced farmers to intensify, and most cattle and nearly all poultry are now housed—the former at least for the winter months and the latter all the time. These changes have introduced difficulties with manure storage and disposal because of smells, unsightliness, and water pollution by runoff from yard concrete or manure heaps. With profit margins at their present levels nobody can insist on a return to ranching or free range, but high standards of manure management are required to prevent justifiable complaints of nuisance.

Fortunately, the general national picture is not as black as it might seem, because Parliament, the agricultural industry itself, and many amenity societies are all making strenuous efforts to encourage the maintenance of a

purity in our environment. This effort will be wasted, however, without a willingness by the public at large to participate. It is no good leaving it to one's neighbour, for if man does foul up his local environment then Britain is too small a country for areas to be abandoned in favour of virgin territories. Our population is also expanding, and this imposes increasing demands for food, water, housing and recreation space.

Nuisances that can arise

The countryside is a place of work and business. It is not a haven of rest for city workers to escape from all of life's pressures. Urban workers who live adjacent to farms must expect some country noises and smells and even some mud in the winter months. However, a farmer must not abuse his position by causing unnecessary noise and smell, and manure management is a vital part of livestock farming. Liquid manure goes anaerobic and gases are released (mainly hydrogen sulphide, ammonia and methane) when it is left for some time in the absence of air. Anaerobic activity also increases with temperature and smells will be at their worst in warm, damp weather. Regular land spreading will help to keep odours down, and aeration before pumping will ultimately remove much of the smell from liquids.

Silage liquor is universally offensive and farmer's wives complain as much as anybody. There is no simple answer except wilting the grass before ensilaging it and field spreading the liquor by sealed tanker after it has been collected. This should be done regularly.

When straw bedding is being used in livestock housing few difficulties arise because moisture is absorbed and biological activity is relatively low. The position is worst when spray irrigation is used for liquid wastes. On a windy day, odours and spray particles can travel considerable distances; farmers who use liquid disposal systems must be most careful to choose still days to empty their tanks and not place the nozzle outlets where there is nearby residential property on the downwind side. Farmers can also co-operate with non-agricultural interests by limiting activities at week-ends and on public holidays when there are more city dwellers in the countryside.

Noise is much more of a problem in towns and near airports than it is in the countryside, but continuous sounds at a high pitch, e.g., extractor fans or perhaps a drier unit, are more tiring than intermittant noises of variable pitch, such as that from vehicle traffic. Farmers who operate machinery and run it continuously should endeavour to mount the equipment on a sound absorbant base to avoid echoes against resonant building materials like corrugated iron.

When livestock farming is carried out in semi-urban areas, stray dogs and trespassers are serious nuisances, and may force farmers either to house livestock or go out of animal production altogether. To many people the sight of livestock in the countryside is itself an amenity, and it is selfish to force farmers to abandon the very practice that gives the least waste disposal problem. Cattle can also be injured by eating or treading on broken bottles, cans or garbage that have been dumped by the city dweller.

Rights and liabilities

The legal position with regard to waste disposal is both complicated and diffuse. There is no tidy consolidating Act which defines the whole situation

clearly. Generally the picture is as follows:

1. New farm buildings of less than 5,000 sq. ft of area are normally exempt from planning control if they are more than 80 ft from a classified highway and if the total area of new buildings erected in the preceding two years does not exceed 5,000 sq. ft. There are only minor exceptions to this rule. If a local planning authority specifically wishes to ensure that a smaller building is subject to control it is necessary for the Ministry of Housing and Local Government to issue an order under Article 4 of the General Development Order 1963. This order must be confirmed by the Minister and compensation may be payable if permission is refused. To view this freedom in perspective however it must be emphasised that 5,000 sq. ft of building only represents housing for only approximately 45 cows or 250 pigs or 5,000 poultry. These are small units by present day standards.

2. Legal action for nuisance, e.g., smell or noise, may be brought either at common law or under section 92 of the Public Health Act 1936. The principal object of the action is to obtain either an injunction or an abatement order against the offender. The best defence to a statutory nuisance concerning the storage and disposal of manure or effluent is to prove that the best practicable means had been taken for preventing the system from being prejudicial to health or a nuisance in the neighbourhood. Nevertheless, actions concerning odours are still very difficult to prove because the human brain is more sensitive to odours than any existing laboratory instrument and if, for example, 90 per cent of the cause of a smell is removed, it does not follow that 90 per cent of the effect of the smell on the human brain has been removed. There may indeed be little perceptible difference. For this reason odour complaint cases are difficult to bring in the courts, and the evidence can only be by witnesses and personal opinion. Humans also suffer odour fatigue if subjected to a smell for a long time, and opinions as to what is unpleasant vary.

3. The Rivers (Prevention of Pollution) Acts 1951 and 1961 forbid the discharge of farm or trade effluents into a stream or watercourse unless it has been agreed to in writing by the Local River Authority. It is unlikely that consent for a discharge of worse than 20 mg/l BOD and 30 mg/l suspended solids would be granted, and additional restrictions may be imposed in respect of heavy metals or trace elements. This legislation largely restricts discharges into streams or watercourses, and helps to preserve the purity of rivers for public water supplies, recreation and cattle drinking. Good neighbourliness also extends to honouring the rights of adjacent riparian owners although the Water Resources Act 1963 now largely controls the abstraction of water from a river for farm use.

4. Solid refuse on a farm is not as big a problem as animal manure but plastic sacks, old baler twine and metal implements and similar items can be a nuisance if dumped in the countryside. In my opinion city dwellers are much greater offenders in this respect than farmers, and for them there is no possible excuse because the Civic Amenities Act 1967 provides the means for their bulky garbage to be disposed of at little, or no, financial cost. Local authorities provide litter bin facilities at roadside lay-bys and public picnic areas, and if the holiday makers early in the year despoil the countryside then the facilities are ruined for those who come later. Good neighbourliness applies to visitors to the countryside as well as farmers.

Farm Rents in England and Wales

THE first rent enquiry was carried out by the Agricultural Land Service in October 1961. Since then, articles have appeared regularly in *Agriculture* each spring giving the main results of the previous October's enquiry. In 1969 full details of the October 1968 survey together with a summary of information from earlier enquiries were made generally available for the first time in Agricultural Land Service Technical Report No. 19* *Farm Rents*. A further report covering the 1969 enquiry is in preparation. These reports form part of a new series on land economics which includes Technical Report No. 20 *Agricultural Land Prices in England and Wales** published in February 1970.

Results of the ALS rent enquiry 1969

The Agricultural Land Service enquiry into farm rents in England and Wales in October 1969 covered 3½ million acres of tenanted land or rather more than a quarter of the tenanted acreage of crops, grass and rough grazing recorded in England and Wales in the 1969 June Census. It related to 19,500 farms of which approximately 4,500 had had a rent change between October 1968 and October 1969. The average rent per acre of crops, grass and rough grazings rose by about 7*s*. per acre or 7·1 per cent. This percentage increase which was the same as in the two preceding years has varied little over the past seven years.

The average rents per acre were as follows:

Table 1

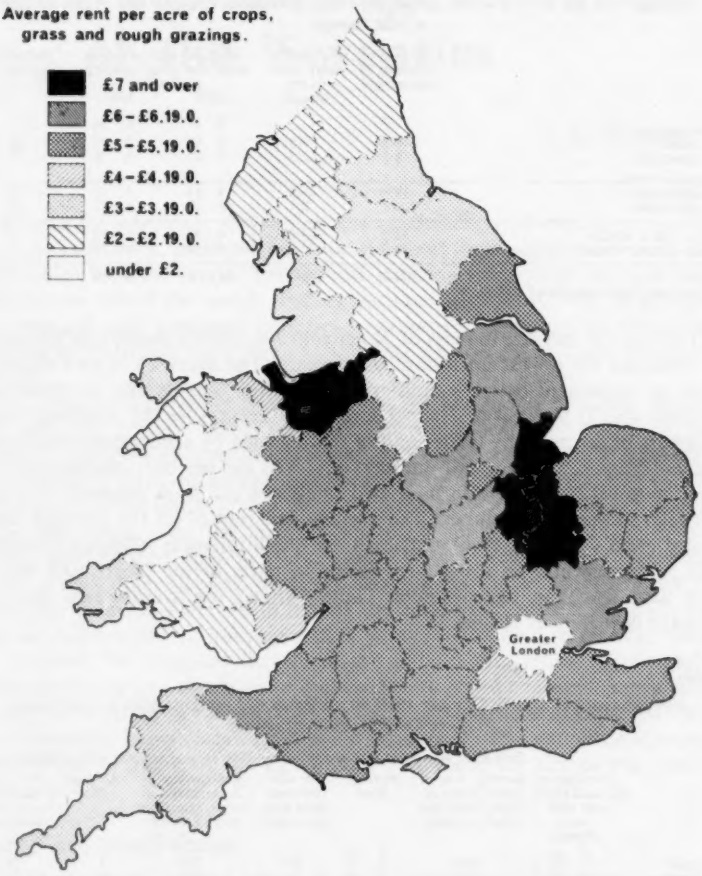
Average rent per acre of crops, grass and rough grazing

	October 1968		*October 1969*	
	£	*s.*	£	*s.*
England	4	15	5	2
Wales	2	10	2	13
England and Wales	4	9	4	16

These figures hide large variations between countries as the map on page 169 highlights. The intensively farmed areas of good quality land in Lincolnshire, Cambridgeshire and Cheshire command the highest average rents.

*Obtainable from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex. HA5 2DT.

Average County Rent Levels, 1969



Much of the southern half of England has above average rents while in the upland areas of the North and Wales rents of under £2 10*s*. per acre are common, and rents on some hill farms are less than 10*s*. per acre.

Nearly a quarter of the farms in the enquiry, about the same proportion as in previous years, had a rent change between October 1968 and October 1969.

About three-quarters of the farms had a rent change in the previous four years and only about 4 per cent had no change during the past ten years. As in earlier enquiries there was considerable variation in the levels of new rents and in the percentage changes over the previous year's figures, depending on which of the four categories of rent change was involved. Table 2 analyses rent changes by type of rent change:

Table 2

Average rent per acre of crops, grass and rough grazing in England and Wales by type of rent change

	Per cent of holdings in the sample	Per cent of total acres in the sample	Rent per acre of crops grass and rough grazings at October 1968	1969	Per cent change*
			£ s.	£ s.	
New tenancy					
by tender	0·3	0·5	2 18	5 9	+ 88
by agreement	2·2	2·5	4 10	6 4	+ 37
Sitting tenants					
by agreement	19·9	24·1	4 14	5 15	+ 21
by arbitration	0·1	0·1	3 17	6 12	+ 70
Total with a change	22·5	28·3	4 13	5 15	+ 24
Total with no change	77·5	71·7	4 8	4 8	—
	100·0	100·0	4 9	4 16	+ 7·1

*Calculated from unrounded figures.

The average increase in rents of 24 per cent was slightly below that recorded in 1968 and the lowest for a number of years. The majority of rent changes were by agreement between landlords and sitting tenants and for these the increase was 21 per cent or 21*s.* per acre. The increases for the relatively small numbers of farms let by tender and of rents settled by arbitration were much higher; because of the small numbers involved the per cent changes in rent and the levels of new rent in these two categories can show marked variation between succeeding enquiries. The average new rent of £5 16*s.* per acre concealed great variation. New rents on some small intensive holdings exceeded £25 per acre while on some large farms in parts of the North and Wales they were less than 10*s.* per acre. Table 3 shows the average rent and the average new rent by region.

Table 3

Average rent per acre in October 1969 on all farms and on those with a rent change since October 1969 by region

		New rents negotiated with a new tenant			New rents negotiated with a sitting tenant		
	Average of all rents (*with and without a change*)	Average size of farm (*acres of crops, grass and rough grazing*)	Average Rent	Per cent increase over previous year	Average size of farm (*acres of crops, grass and rough grazing*)	Average rent	Per cent increase over previous year
	£ s.		£ s.			£ s.	
Eastern	6 10	268	8 5	37	259	7 0	23
S. Eastern	5 10	248	7 0	36	241	6 2	20
W. Midland	5 19	147	7 13	42	155	6 14	25
E. Midland	5 17	222	7 11	47	232	6 13	22
S. West	5 1	181	6 13	48	196	5 10	18
North	2 19	264	3 8	37	225	3 18	18
Yorks and Lancs	3 13	218	3 19	42	236	4 9	21
England	5 2	211	6 6	42	216	5 4	21
Wales	2 13	185	3 13	61	134	3 8	31
England and Wales	4 16	208	6 1	43	207	5 15	22

These are averages for the regions and as such do not show the substantial variations that occur in actual rents within regions and counties.

Some aspects of the papers read at the 24th OXFORD FARMING CONFERENCE, which was held in the Town Hall, Oxford, on 5-7th January, 1970

The Challenge of the 'Seventies

S. R. O'Hanlon

WHETHER by astrology, divination, the consultation of oracles or merely inspired guesswork, mankind has from primeval times sought to remove the veils which hide the future. The Oxford Farming Conference may not have enlisted the aid of the occult, but its purpose nevertheless was to examine the political and economic auguries to forecast the means by which the challenges to British agriculture in the next decade might most effectively be met.

The accelerating pace of change that has marked the past quarter century has given the average farmer plenty of practice in flexibility, both as to his thinking and the techniques of his production, and there is every indication that emergent patterns of the 'seventies will be no less demanding on the great majority of farmers, and even daunting to some. The great question mark that hangs over the farming horizon is, of course, whether or not Britain will join the Common Market, and if so on what terms. In the opening paper of the Conference MR. MICHAEL JOUGHIN saw our entry into the E.E.C. (probably enlarged from six to ten) as the antidote to present 'floundering' and the opportunity of 'playing a leading part that would restore our sense of purpose'. He accepted that there are in-built difficulties, for example, high price levels and objection to our marketing board concepts, but he said, 'as farmer to farmer we could compete because the structure of our industry, with markedly larger farms, gives us an advantage'. The really fundamental issue is that of financing the agricultural policy and the size of our contribution to it.

Large and small farms

Farm structure is indeed one of the most important factors requisite to the health and uninterrupted growth of agriculture. The trend towards bigger farming units has been gaining ground in Britain for some years now, alongside the transition from tenanted to owner-occupied holdings. And this we can expect to continue. So the HON. J. A. DAVIDSON'S examination of the advantages and disadvantages of large-scale business within the contemporary framework was assured of an attentive hearing. 'There are, no doubt, advantages to be gained from economies of scale', he said ,'but on the other hand, there is always the danger that sheer size will result in stagnation, indecision and overheads which are difficult to control. Size, like beauty, is

relative; but, unlike beauty, size is usually related to capital assets and financial strength.'

As he has found in the administration of over 4,000 acres, success depends on decentralization of authority and responsibility, and, equally important, clear lines of communication. However large the business, personal contact and skilled husbandry are vital to its success. The challenges of the next ten years resolve themselves into how we are going to maintain and increase profitability and how far we should diversify or intensify. Capital, land and labour dictate the limits of our farming policy, whatever the size and nature of farm.

The smaller farmers' point of view was made by MR. M. WARMAN, who has a 70-acre all-grass farm in Cornwall. He took as his example the intensive dairy unit where the statistician's man and a half look after a cow to the acre on anything from 60 to 100 acres and measured it against 'the baffled disbelief that anyone could be so stupid as to want to volunteer to become a small farmer with all the drudgery involved'. The greatest asset of the small farmer is his productivity, which means *effective* work, and the efficient farmer must, said Mr. Warman, be ready to take and make use of the technical advice provided by the Ministry's Advisory Services and conferences such as this one.

A young man setting out in the farming business in the 'seventies with the ambition of building up a truly viable unit in return for a sensible level of daily work, may be well advised in the early years to earn some money outside the farm whilst growing in technical ability and consolidating his base of operations. 'I'm a small farmer because I want to be', said the speaker, and that sentiment will assuredly be echoed by the overwhelming majority of small farmers. Amalgamation of holdings will, Mr. Warman believes, show some acceleration in the 'seventies, 'which is neither an evil to be avoided, nor is it a panacea of prosperous farming, but rather one more tool for our contemporary farmer to make use of'.

Not unrelated, if sometimes overlooked, to the relevance of farm size in the overall structure of farming Britain is the size and quality of the work force that can be deployed. Euphemistically termed 'transfer of resources', the drift of labour from agriculture has reached an all-time high. MR. C. H. PLUMB, President of the N.F.U., quoted the current estimate that the existing labour force of 355,000 regular workers may be reduced to about 200,000 by 1975; and the ranks of producers, now around 340,000, may be thinned to some 300,000. Recruitment problems, said Mr. Plumb, become all the more urgent when it is remembered that a very high proportion of this total is approaching, or already in, the higher age groups. 'The image of agriculture as a career must therefore be improved. We must convince young people that they can enjoy just as much opportunity for promotion in agriculture as in industry.' Mr. Plumb was confident that farming in the 'seventies would reach still greater heights of productivity notwithstanding a still declining labour force; mechanization and automation have not yet reached their peaks. But this assumed capital injection and sympathetic government policy, and—a new factor—favourable public opinion. The question of intensive livestock production, for example, and the rediscovery of the countryside as an amenity area, will have repercussions that could affect the size and cost of the labour force.

Food of the future

From his opening sentence it was clear that MR. MICHAEL LEYBURN, Technical Editor of the *Farmers Weekly*, was going to flutter conservative thinking in livestock circles by some personally held disruptive views. Ruminants, seen as notoriously inefficient utilizers of energy, may, he suggested, become of less importance in farming, and the simple-stomached animals like pigs, poultry, rabbits and fish, more important—a trend already apparent, though tending to be masked at the moment by affluent demand. Long term, 'red meat will first become a luxury food and will then cease to be produced' —a major consumer change, perhaps, but a habit that could be phased out over a generation or two. Stricter selection to improve the efficiency of our livestock is likely to be a feature of the 'seventies, and more attention concentrated on the animal as a productive unit. 'It is ludicrous', said Mr. Leyburn, 'that a beef cow's entire output for a year should be a single calf and that the average sheep in Britain produces only 1·2 lambs'.

It was inevitable, too, that Mr. Leyburn should point to what he envisages to be the future of liquid milk production, forecasting that under the price challenge of artificial and powdered milk very little liquid milk will be sold in Britain in ten years time. 'There can be few more wasteful occupations than carting enormous volumes of liquid around the country, putting it in bottles and delivering it to every doorstep when 87 per cent of it is water', he said. Judged by American experience, meatless meats may not be all that far away from British supermarkets to challenge the natural and orthodox product; from all of which it follows that farmers should no longer think of themselves as being in the farming industry only, but rather broaden their outlook and consider themselves in the food production industry.

The implication for farmers of advances in food technology was also the subject of a paper by DR. MAGNUS PIKE, who thought we may reasonably expect to see the extension of an agricultural metamorphosis whereby farmers and growers, working to a master plan, produce large-scale standard products in a form specifically designed to meet the needs of the food technologist. Housewives have been wooed and won by convenience foods, which are clearly here to stay, but it is not Dr. Pike's opinion that every article of diet will become standardized, uniform branded products. 'The taste of television dinners and of what is sometimes called the 'spun protein analogue' is very good, but it is not quite the same as the unprocessed food', he said. Deep freeze may widen its incidence in the 'seventies, so enabling the farmer to provide domestic consumers with wholesale cuts—and these at times convenient to him rather than the processing manufacturer.

A greater degree of concentrated buying power will, in MR. D. H. PICKARD'S view, probably face farmers as the 'seventies advance, with more supermarkets, multiple shops and fusion of retailing groups taking over the High Street scene. Producer marketing groups and co-operatives have therefore a role to play to which farmers should give thought. Some, but not all, marketing organizations have developed 'pretty satisfactorily' in the 'sixties, said Mr. Pickard, but one of the principal problems we still face in the 'seventies is to break through into a new structure. The organizations which farmers build for themselves are designed to do a specific job and must therefore be businesses in their own right—each 'an organism with an identity of its own', as Mr. Pickard phrased it.

The crystal ball is not a farming tool (though no farmer will deny the advantage of possessing one); thus all that the Oxford Farming Conference could be expected to achieve in the first month of the first year of the new decade was, by assessing in all relevant spheres the vigour of trends already manifest or discernible and anticipating cause and effect, to get some kind of guide-line thinking to help with the making of blueprints in the future.

A full report of the Conference proceedings, which should be available by mid-May, can be obtained from the Hon. Secretary, M. H. R. Soper, O.B.E., Dept. of Agricultural Science, University of Oxford, Parks Road, Oxford, OX1 3PF. (price 12*s.* 6*d.*).

The Ministry's Publications

Since the list published in the March, 1970, issue of *Agriculture* (p. 142) the following publications have been issued.

MAJOR PUBLICATIONS

BULLETIN

No. 112. Pot Plants (SBN 11 240412 X) (Revised) 14*s.* (by post 14*s.* 8*d.*)

OUT OF SERIES

Agricultural Statistics in England and Wales, 1967/68. (SBN 11 240952 0) (New) 20*s.* (by post 21*s.*)

Agricultural Statistics in United Kingdom, 1966/67. (SBN 11 240966 2) (New) 10*s.* (by post 10*s.* 6*d.*)

FREE ISSUES

ADVISORY LEAFLETS

No. 68. Carrot Fly (Revised)

No. 176. Currant and Gooseberry Aphids (Revised)

No. 199. Wireworms (Revised)

No. 538. Handling of Purchased Seed Potatoes (Revised)

No. 567. Foot Rot in Sheep (New)

No. 568. Disposal of Unwanted Day Old Chicks and Turkey Poults (New)

No. 571. Fireblight of Apple and Pear (New)

SHORT TERM LEAFLETS

No. 19. Choosing Selective Weed-killers for use on Cereals in the Spring (Revised)

No. 98. Laying Cages (formerly A.L. 387) (New)

UN-NUMBERED LEAFLET

Safe Use of Poisonous Chemicals on the Farm (Revised)

Priced publications are obtainable from Government Bookshops (addresses on p. 198) or through any bookseller. Single copies of the free items are obtainable from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex, HA5 2DT.

Eating out continues to grow steadily, but the market will, most likely, be dominated by a demand for well-prepared but basically simple foods.

Eating Out Trends

John Fuller

'WHAT an English labourer spends on his bacon, beer and white bread is, in the hilly parts of Scotland, spent by the Scottish labourer on the education of his children'; so asserted the Quarterly Journal of Agriculture in 1836*. Region, tradition, income are still amongst social and economic factors which now, as then, affect food habits and choice. Food consumed at home presents teasing questions to producer and distributor, but even more complex is the situation when eating out; for consumers bring to canteen and restaurant, school or hospital, a whole set of dining reflexes, prejudices and idiosyncracies which may have little to do with food itself. Yet eating out grows steadily (catering trades turnover up again by 9 per cent last year†); so what people want when eating away from home is of significance not only for the caterer but for primary producer and food processor too.

British breakfast changes

Caterers seek to evaluate customers' wants; but whilst some seek food 'the way mother used to make it', others may seek meal experiences as different as possible from those at home. Certainly, what people eat at home does not always mirror what they choose away. Breakfast changes, for example, are illuminated by a National Catering Inquiry report in 1968, *The British Eating Out at Breakfast*‡. This suggests the cooked British breakfast survives more in hotels than in homes. At home, average breakfasts consist of cereal, untoasted bread and tea; but in hotels, most people take a more traditional cooked meal. Orange juice, eggs and bacon, toast and marmalade, followed by coffee or tea, is chosen by three out of four travellers. How long will hotels remain the last bastion of the British breakfast? Inclusive 'bed and breakfast' rates are gradually giving place to separate charges for accommodation and food; thus the cheaper Continental breakfast may further erode our cooked breakfast habit. However, visitors to Britain from overseas may help to sustain demand for the bigger breakfast, for another NCI survey§ shows fifty five per cent of our foreign tourists want the full breakfast treatment.

*Burnett J. 1966. *Plenty and Want*. Nelson, London.

†*Board of Trade Journal* 17th December 1969.

‡National Catering Inquiry. *The British Eating Out at Breakfast*. Smethursts Foods Ltd., Walton-on-Thames, 1969.

§National Catering Inquiry. The Visitor *Eating Out in Britain*. Smethursts Foods Ltd., Walton-on-Thames.

Popular foods

As for other meals and food customs, our survey suggests visitors from abroad expect to find and enjoy 'traditional' British fare. Mentioned as particularly enjoyed was roast beef (23 per cent), fish and chips (20 per cent), English cheeses (17 per cent), steaks (16 per cent), puddings and sweets (16 per cent), steak and kidney pie (10 per cent). This gives some encouragement to the belief that food with a 'national identity' may better support tourism and develop new holiday markets. Yet such zeal for 'our own kind of fare' is tempered by recognition that any fare to support tourism needs to be based on more discriminating domestic demand. Catering both for ourselves and our visitors is intertwined. Certainly, catering for tourists is highly significant; continued growth in our tourist trade brought over four million visitors to Britain in 1968 (14 per cent more than 1967), who spent £282 million*. About half the total expenditure by overseas visitors is in hotels and restaurants.

Probing dish or commodity choice by our own native diners in the earliest NCI survey (*The British Eating Out, 1966*)†, confirms the 'beefeater' notion of our tradition. Meat is majority main course choice, poultry second and fish (including shellfish) less highly rated. Soup was still most frequently chosen for first course, with melon, fruit juice or hors d'oeuvre following in popularity. Fewer opted to start with shellfish or pâté but later inquiries showed these to be the choice of those ready to pay higher prices. Apart from potatoes (almost inevitably one of two vegetables), peas, Brussels sprouts, cauliflower and green beans led, in that order, diners' vegetable choice (strangely, British caterers at that time over-estimated the popularity of cabbage). Confirmed, too, was the trend away from cooked sweets and puddings towards fruit salads, light desserts and cheese.

Price was superficially probed by this survey, but produced somewhat anomalous responses. On frequency of dining out, a majority said they would do so more often if food was cheaper; yet low price was almost the last factor affecting choice of restaurant. Thus, there is little evidence that the old adage 'quality is remembered when price is forgotten' no longer remains valid. Value for money, rather than cheapness alone, remains as interesting to eaters out as to customers in the retail food store.

Food is only one meal factor

Do Britons care enough about quality? A New York restaurateur contends‡ that 'restaurant people worry too much about food' and that 'if all people wanted from a restaurant was good food, they would eat at home, where it is cheaper'. But our first NCI survey confirmed good cooking as the factor which most determined choice of eating place; this was followed by a clean looking room, fast service, hot food, atmosphere, extensive menu, good presentation, friendly service, low prices and large helpings. On holiday, British priorities seem to change; the survey *British Eating Out on Holiday*,

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**British Travel Association Annual Report*, 1968. London 1969.

†National Catering Inquiry *The British Eating Out*. Smethursts Foods Ltd., Walton-on-Thames 1966.

‡*Who says the New Breed Doesn't Care*, Institutions Magazine, Chicago, U.S.A., August 1968.

placed good food (8 per cent) behind scenery and countryside (20 per cent), accommodation (16 per cent) and local amenities (13 per cent) as factors inducing Britains to return to a home resort for another holiday. Relative insignificance of food in home holiday choice challenges all in the food and holiday business; especially if we look beyond the home market to our visitors from overseas.

Restaurateurs catering for leisure and pleasure diners out realize they are selling a total dining experience. Even where food alone seems to dominate choice of eating place, it is increasingly the exotic (and hard to prepare at home) food which sets the pace. One estimate, given by Institutions Magazine, suggests there are 7,000 Indian restaurants in this country. The increasing tendancy of Indian, Chinese and other exotic restaurants to operate a take-away service means that such fare penetrates domestic dining too. The 'trattoria trend' or Italian influence in catering already evokes comment.

Yet whilst more British diners out seek to 'go native' in other national food idioms, many also support our own kind of food in steak houses and grill rooms. We have already noted overseas visitors' interest in our traditional fare; so both foreign and domestic demand underpin the growth of places offering British food like steak and kidney pie, roast beef, potted salmon and chops and steaks. Such fare, backed by appropriate decor and styling, gives the overseas tourist the 'being abroad' atmosphere. That such trends are popular, too, with British eaters out is not surprising, for 'steak houses', 'carveries', 'rib rooms' are not too far removed from 'silver grills', chop houses or inns (with their 'ordinary') of former times.

International style restaurant food or French cooking certainly continues to remain enshrined in gourmet restaurants and to attract the gastronome. Former hotel and restaurant users, the *nouveau pauvre*, may have favoured French menus. They continue to use (less frequently than businessmen) the restaurants of town and country hotels. Even they find the French table d'hôte menu camouflaging predictable set meals regrettable. In 'popular' catering, French menus and French cooking are on the retreat. In more modest hotels and restaurants where French lingers, it seems to do so in language, often mispelt, rather than a real attempt to perpetuate the Escoffier tradition.

The convenience element

Dining out trends, therefore, point on one hand to the lure of oriental restaurants and, on the other, to the grill room's appeal. But this 'curry and chips' combination is no more significant than a third 'C' trend—convenience. André Simon has observed* that 'there is today, on the whole, a greater variety of better cooked fare in millions of modest homes than there was in the days of the traditional family cook-general'. Unlike some food and wine writers, Simon, is realistic about 'conveniencing'. He acclaims the deep freeze as 'one of the greatest gifts of science to the modern housewife'. It has probably done more than anything else to introduce a greater measure of gastronomic curiosity and interest in the traditionally conservative food habits of the English. Simon appreciates not only that forms of processing provide a much greater variety of good quality food throughout the year, unaffected by season and weather, but 'that many or even most deep-freezed

*Simon A. L. (1969) *Fashions in Food and Wine, R.S.A. Journal.*

foods have been peeled or scraped, washed and trimmed, some of them even cooked for us, thus saving labour as well as time'.

Now the caterer is even more interested than housewives in the labour element of a meal. For the more that service is demanded in increasingly affluent societies, the less desire there is to adopt a service career. Caterers, battling to meet ever-growing demand, face the challenge of shortage of trained staff. Good cooks, waiters and washers-up remain scarce. Mechanical 'servants' like automatic oven, mixing machine, dishwasher, and the 'in-built' servant lurking within those pre-prepared foods, have already been accepted with alacrity in the home by British housewives. Caterers, conscious of imponderables influencing diners out, were more dubious about accepting convenienced foods. Yet in the U.S.A. and, increasingly, here, production emphasis inexorably shifts from restaurant kitchen to food factory.

Some caterers and their customers fear the impact of technology on food generally and eating out in particular. Others look at modern clothing retailed through mass outlets; they appreciate how this has encouraged careful specifications to meet market needs in price and quality and has lifted standards of dress and fashion. More are asking 'can we do a similar job for eating out?' To do so successfully, today's caterers increasingly believe they must continue to harness technology to raw materials, plant and techniques. They are more ready to revise and even discard old food lore of the French *maitres chefs*. In creating new concepts and dishes they are keener to re-examine the tastes of countrymen and visitors alike. There is especial interest in pursuing the idea that good fare has its roots in the soil of our own land or emerges from our coastal and river waters.

Link with agriculture and fishing

Catering teachers have long appreciated our kinship with primary food producers—catering's link with farmers and fishers. In the Scottish Hotel School of Strathclyde University we have mounted promotional luncheons and dinners at home and overseas in partnership with the National Farmers' Union of Scotland, the British Farm Produce Council and with various marketing boards. These have revealed what can be done with British fare in the British idiom. Can we do more? Supported by B.T.A. and the British Farm Produce Council, we are, at Strathclyde, re-appraising the potential in British agriculture and fishery produce for preparation within culinary disciplines of identifiably British style. We seek to accelerate the growth or re-birth of a professional form of British cookery. This re-examination of our native produce and our regional cookery traditions takes place, of course, in the light of what food manufacturers and processors contribute now and in the future to primary products.

Reviving British food and cookery does not imply abandonment of cuisine concepts evolved under French chefs. Cookery is not static but responds swiftly to social, economic and technical influences and especially to changes in the products with which cookery copes. Colonial venturings brought new commodities, especially spices, into our culinary tradition; and also affected choice to the extent that palates as well as minds are broadened by travel. Curry was accepted by many as part of a British repertory of dishes before the new popularity of Indian restaurants. Yet it remains important to be jealous of those special characteristics derived from our own native produce, our regional history and our local taste. The newer mass markets at home will,

I believe, be dominated by a demand for well-prepared but basically simple fare, even cooked or 'finished' by 'homely' processes, though presented with style and enhanced by improved, even dramatic, surroundings and service.

Caterers will undoubtedly seek to achieve these goals with food service 'systems', based on new forms of commodities and new kitchen equipment. Almost a quarter of the average person's home spending on food in 1967 went on dried, canned, frozen and other 'convenience' foods*. We lack hard statistics about such foods in the eating out situation but few doubt that a similar proportion, certainly more than one-fifth, of caterers used 'convenienced' or processed foods. Despite the forebodings of traditionalists, such commodities encourage systemization of catering and so far have tended to lift rather than depress standards in the newer, mass eating out markets. They certainly help reduce hazards caused by trained staff shortage and level standards throughout all forms of 'popular' catering, whether 'commercial' (cafes, restaurants) or 'welfare' (canteens, institutions).

What farmer and fisher now produce as raw material for food manufacturer, packer, housewife and caterer can, through technological processes, give new cooking and serving opportunities. Caterers, like housewives, must inevitably deal increasingly with commodities changed substantially from the original product of farm, orchard, lake or sea. Whether at home or in large or small businesses, cookery in the seventies must cope with convenienced commodities. To meet new challenges from new food forms, everyone in the food chain, from prime production to table, should link harmoniously and effectively. More communication is wanted between all sectors in the food industry; between farming, fishery, food manufacture, preservation and processing, cooking and catering equipment manufacture and, not least, those of us who finally prepare food for service to our guest, the diner-out, whether British or from abroad.

The author of this specially contributed article, **Prof. John Fuller,** is Rank Organisation Professor of Hotel Management and Director of the Scottish Hotel School in the University of Strathclyde. He is also Chairman of a National Catering Inquiry (sponsored by Smethursts Foods Limited) which has conducted a series of surveys on eating out in Britain since 1966.

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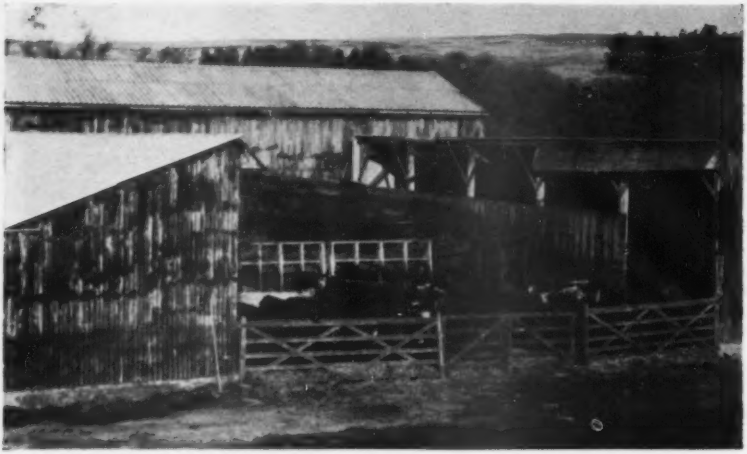
*Ministry of Agriculture, Fisheries and Food (1966) Household Food Consumption and Expenditure. H.M. Stationery Office 1969 price 23*s.* (by post 24*s.* 2*d.*)



Outwintering of suckler calves

Redesdale E.H.F.

J. R. Thompson, *Director Redesdale Experimental Husbandry Farm*

A BRIEF description of Redesdale farm and its background was given in the May, 1967 issue of *Agriculture* by P. J. MacFarlan, then Director of Experiments for Agriculture. An adjoining hill known as Dargues Hope with an offlying county council smallholding has subsequently been taken on a twenty year lease. This article describes the progress which has been made in setting up Redesdale as an experimental farm.

Redesdale now consists of three holdings:

Cleughbrae consists of 1,627 acres of enclosed hill, and 130 acres of better inside ground of which 90 acres can be mown. The whole faces north-east and is very exposed with little natural shelter. Much of the area is covered by peat to verying depths intersected by narrow sandstone ridges. The main vegetation consists of flying bent, rushes and draw moss with bents and fescues on the drier ridges with very small pockets of bracken. There is some heather but this is stunted and of poor quality due mainly to the wet conditions which prevail over the whole area.

Ashtrees consists of 497 acres of enclosed hill, and 50 acres of inside ground, 30 acres of which can be mown. The hill is again very exposed and faces north-east. The vegetation is similar to Cleughbrae but there is more heather and, on the drier ground, some of this is of good quality. Peat of varying depths covers most of the hill.

Dargues Hope and Dargues Farm. Dargues Hope, which adjoins Ashtrees and Cleughbrae hill, consists of 1,521 acres of enclosed hill with no buildings or inside land. There is a good mixed vegetation and, in the main, it is a much drier hill with some natural shelter and approximately half the land facing south. Dargues farm was a county council smallholding of 52 acres which was transferred to the Ministry. It lies about a mile away from the main hill and provides accommodation for a shepherd. It also enables any poorer ewes to be drawn in from the hill during winter and allows ewes with twins to be kept on better ground until clipping time.

Stock

A hefted pure bred flock of 1,000 Scottish Blackface ewes plus replacements was taken over in May, 1967, together with 63 Galloway cows and calves by a Cumberland White Shorthorn bull. The sheep were in the main bred pure and the bulk of the lambs sold as stores in the autumn. The cows calved in the spring, calves being sold at the suckler sales later that year. When Dargues Hope was taken in May, 1968, a further 452 breeding ewes and 119 replacements were taken on valuation. The farms are tick infested and this creates difficulties if stock are brought in from clean areas outside and are not acclimatized.

Buildings

The existing buildings on the farms are typical of those found in the area. They make heavy demands upon labour and are not suitable for carrying out critical experimental work.

Access to the farm was not good, and surveyors calculated that a bridge over the river Rede had a safe load-carrying capacity of only 4½ tons. This meant that the bulk of supplies had to be unloaded at a neighbouring farm, entailing expensive double handling and causing considerable inconvenience. It was not possible to commence any building work until this bridge was replaced and a new road laid to the main steading.

Short-term trials

Lamb fattening. The Farm Advisory Committee decided that, without the essential facilities to undertake accurate experimental studies, a certain amount of short-term exploratory work should be carried out. Following the extremely poor trade for store lambs in 1965 and 1966, it was agreed to study the feasibility and economic implications of fattening rather than selling them as stores. Since then 2,400 hill lambs have been successfully fattened at Redesdale under various systems. Lambs have been fattened on aftermaths top-dressed with 40 units of nitrogen and supplemented with varying quantities of a cereal-based concentrate. Different types of green crop have been grown as part of a land improvement policy, and the problems

Scottish Blackface ram

of fattening lambs on these crops have been studied. Attention has been paid to the smaller tail-end lambs which always present a problem and are particularly difficult to sell in the store market. The majority of these smaller lambs have been fattened indoors using existing buildings on the farm, the only expense incurred being to provide clean drinking water. Different rations have been used and the techniques of introducing hill lambs to high concentrate rations studied.

The work shows that small hill lambs can be successfully and economically fattened indoors. There is not a quick and easy fortune to be made, but the system can provide an alternative outlet and makes the farmer independent of the store market.

All the fat lambs are marketed on a deadweight basis, and every carcase is examined and scored for quality according to a scale prepared by the Meat and Livestock Commission. The results are then related back to the treatment of the ewe and the system of fattening.

Ewe management. Trials have been started on the effect of different systems of management and feeding upon the lambing percentage of hill ewes. These indicate that with adequate feeding, and reasonable facilities at lambing time to reduce losses immediately after birth, a lambing of 100 per cent can be attained.

Disease control is being studied, in conjunction with the Veterinary Investigation Centre, emphasis being placed on the importance of worms in hill sheep, and the control of 'tick'. In this connection, one complete 'cut' of sheep running 170 breeding ewes has been placed at the disposal of the Veterinary Investigation Centre, who hope to demonstrate that tick can be eradicated in about two years on a commercial basis. The incidence of liver fluke has been recorded and will be followed as the land is improved and cattle grazing increases.

All the ewes and lambs are individually identified and recorded. As the number of breeding ewes has been increased from the original 1,450 to a total of 1,910, the flock has also been culled, to provide a more uniform population for future experimental work.

Cattle. An autumn-calving herd of 60 Blue-Greys, 30 Welsh Black and Welsh Black X Galloways, and 10 Galloway X Friesians is being built up. These are to be run on the hill which, under normal conditions, would only be considered suitable for spring-calving Galloways. As heifers they are served with an Angus bull to obviate any calving difficulties, but for subsequent calvings different crossing bulls will be used.

Various planes of nutrition will be imposed to study their effect upon milking ability, liveweight gain of the calf, calving index and overall lifetime production of the cow. These cows should calve outside and then be housed either in a cubicle building or in cow kennels during winter. The calves will be weaned at turn-out and introduced to a paddock grazing system on some of the better ground. The cows will go out on to the hill where they can be used as tools for hill land improvement.

The establishment of this herd is now almost complete and the last of the heifers will go to the bull during 1970. With the exception of the Welsh Black cattle which were transferred from Pwllperian, the animals have been bred on the farm. While the numbers were being built up it was possible to do some work on the overwintering and subsequent summering on the hill of spring-born calves.

The calves were all retained and inwintered on easy-feed silage and four pounds of rolled barley per head per day. Over a winter feeding period of 192 days they consumed seven cwt of barley and four tons of silage each, and made an average liveweight gain of 134 lb per head.

For sixteen weeks in summer the stirks grazed an area of *Molinia* on Dargues Hope Hill. They did remarkably well, the bullocks achieving a mean liveweight gain of 150 lb, and the heifers 198 lb. The hill land benefited from the cattle grazing, and already sheeps fescue and *Nardus* is appearing on a previously *Molinia*-dominated sward.

The silage for the calves is made from about 30 acres of bottom land and fits in well with the lamb fattening, enabling lambs to be weaned earlier than normal on to clean aftermath.

Land improvement and fencing

To carry the increased stock, particularly the cattle, fencing and land improvement will be essential. As the land is very wet, most of the improvement will be through surface treatment and controlled grazing. A start has been made, and 150 tons of basic slag have been applied to the mineral soils on the lower slopes of the hill. The forage harvester has been used wherever possible to remove dead vegetation.

The lower part of Ashtrees Hill and three areas on Cleughbrae have now been fenced so that grazing can be controlled and critical work started.

On Dargues Hope hill is an area of approximately 320 acres on a south facing slope carrying a 95 per cent *Molina* sward. This has now been fenced into two enclosures of approximately 110 acres and 210 acres, and the intention is to subdivide the latter. Soil samples indicated a pH of 4·0 and a lime deficiency of four tons of ground limestone per acre. On part of the 110 acre enclosure, ground limestone has been applied at 1, 2, and 3 tons per acre and 150 units of phosphate per acre applied. In addition, after heavy grazing with cattle, approximately 50 acres were oversown with the following seeds mixture: one part red fescue, one part *Agrostis*, one part wild white clover and ten parts perennial ryegrass S.24.

The erection of all fences is carried out by contractors. The fences include all those types considered feasible for hill conditions, namely high tensile wire with posts and droppers at varying distances; plain strand wire fence; and the New Zealand electric barrier fence. Gross costs are from 3*s*. 5*d*. per yard for the high tensile wire fence with 5 ft 6 in. posts at 30 yards and droppers every 3 yards, to 6*s*. per yard for pig net fence, with barb on top and posts every 6 ft. The effectiveness and maintenance cost of these fences will be observed over the years. It will be necessary to erect more fences at Cleughbrae and Ashtrees to give adequate control of stock, and enable critical breeding and feeding trials to be undertaken.

Future developments

The farm advisory committee decided that Redesdale falls naturally into three distinct units, each of which is typical of many farms and conditions found in upland and hill areas throughout the country.

The three units are:

Dargues Hope. Consisting of 1,521 acres of enclosed hill and the county council smallholding about one mile away. The intention is to build the sheep flock up to 1,000 breeding ewes plus replacements and see if one man can effectively shepherd this number. Additional gang labour can be supplied for clipping and dipping. To carry this additional stock the land will have to be improved. Different techniques and costs of land improvement will be studied.

Ashtrees. It is proposed to run this 550 acre farm as an intensive unit, testing out to breaking point new systems and techniques. The existing flock of 250 breeding ewes is to be built up to 300 pure Scottish Blackface ewes, plus 100 Draft Ewes which will be crossed with various tups. The progeny of both flocks will be fattened. An autumn calving herd of 40 cows will be introduced. These will be wintered inside and fed on purchased fodder. Calves would be weaned in spring on to a paddock grazing system and sold in the autumn. To carry this head of stock a considerable amount of land improvement drainage and fencing will be essential.

Cleughbrae. On this 1,750 acre holding the main comparative studies will be carried out. These will include hill drainage techniques and methods of land reclamation. The economics of sheep housing will be studied, together with various planes of nutrition and systems of management to raise the lambing percentage and reduce lamb mortality after birth. The suckler cow investigations will also take place on this part of the farm.

Temporary offices, some fences, and buildings have now been erected. The remaining fences and buildings necessary to carry out detailed experiments are to be erected during 1970. Stock numbers have been built up, and both sheep and cattle culled to a uniform standard. This autumn we shall be ready to start on the full experimental programme.

Farm Management Association—Spring Conference

The Farm Management Association's Fourth Spring Conference will be held at Dairy House Farm, Middlewich, Cheshire on Monday, 4th May 1970, by kind permission of Imperial Chemical Industries Limited. The theme will be 'Management Development at Dairy House Farm'.

Further information from the Secretary, Farm Management Association, National Agricultural Centre, Kenilworth, Warwickshire.

This article, prepared by G. Wight, B.Sc., M.R.C.V.S., D.V.S.M., refers to the recommendations contained in the Report of the Committee of Inquiry on Foot-and-Mouth Disease 1968 Part Two (Cmnd. 4225).

Foot-and-Mouth Disease

A COMMITTEE of Inquiry on foot-and-mouth disease under the chairmanship of the Duke of Northumberland was appointed on 28th February 1968 'To review the policy and arrangements for dealing with foot-and-mouth disease in Great Britain and to make recommendations'.

In order to report speedily the Committee divided its work into two parts. Their Part One report, which was the subject of an article in the January issue of *Agriculture*, was made public on 1st May 1969, and dealt with policy to prevent the introduction of foot-and-mouth disease virus into Great Britain, and the ways in which the risk of future epidemics might be reduced. They supported the policy of slaughter of infected and in-contact animals and in general the Minister accepted the report. Changes in the import policy for meat came into effect on 1st October 1969.

Part Two of the report (Cmnd 4225)* was published and presented to Parliament on 16th December 1969. It contains a detailed examination of procedures when outbreaks of the disease occur, and deals with such matters as organization, administration, procedures relating to valuation, slaughter and disposal of carcases and sanitary controls. The Committee consider that adequate arrangements in relation to these are an essential component of a slaughter policy if the spread of disease from a primary introduction is to be controlled. Their recommendations on these matters resulted from a study of the accumulated experience of controlling foot-and-mouth disease and of the results of research work on epidemiology since the Gowers Committee reported in 1954. The bulk of evidence the Committee received related to the 1967/68 foot-and-mouth disease epidemic which tested the standing arrangements for the control of the disease in this country to an unprecedented extent. The scale of the epidemic caused the Animal Health Division of the Ministry of Agriculture, Fisheries and Food to introduce many modifications to the control procedures and it is considered that some of these should be included permanently in Control Orders as soon as possible, since they would be of great immediate importance in the event of another epidemic. The Committee agreed that important amendments should not await the completion of their report and some changes were introduced

**Part Two of the Report of the Committee of Inquiry on Foot-and-Mouth Disease* Cmnd. 4225 available from H.M.S.O. (addresses on p. 198) price 12*s.* 6*d.* (by post 13*s.* 2*d.*).

in Amending Orders which came into effect on 20th October 1969. Generally, these changes had the support of the Committee who considered that some of them may require further amendment if the recommendations in the second part of their report were to be fully accepted.

Following an introductory chapter, the second chapter of the report deals with the general arrangements for controlling outbreaks of foot-and-mouth disease in Great Britain before the 1967/68 epidemic. The arrangements described were applied at the outset of the epidemic and as it progressed it was found necessary to modify and strengthen them. Chapter 3 is a discussion of the special problems covering 17 different aspects of disease control including administrative arrangements, infected and controlled areas, milk, slaughter and disposal of carcases, disinfection, compensation, and artificial insemination. Arising out of considerations outlined in this chapter, the Committee tabled 105 conclusions and recommendations.

The report ends with a chapter on conclusions and recommendations in which it is pointed out that a single outbreak could, if conditions are favourable for spread of the disease, lead to secondary outbreaks and even to an epidemic; it is therefore imperative that the control procedures for dealing with outbreaks should be such as to minimize as far as practicable the possibility of the disease becoming widespread.

The Committee stated that 'In considering the methods which have been employed in the past, as well as modifications for the future, we have attached great importance to the early recognition of the disease and the need for immediate action in stamping it out by slaughter and by the destruction of infected material. We have also attached great importance to measures designed to limit spread of the disease by controlling the movements of people, animals and materials. We also stress the need rapidly to define the areas of special risk on the advice of an epidemiological team who can take into account all the factors which may contribute to the spread of the disease.

It should be emphasized that the control procedures necessary to comply with these principles should be based on veterinary considerations only and that they should give rise to as little disturbance of normal commercial and public activities as such considerations would allow. We have, therefore, taken into account what is justifiable and practicable, bearing in mind the hardships which some measures may impose on the farming community and others. We have also taken into account the degrees of risk associated with the various means by which foot-and-mouth disease may be spread. The greatest risk is from infected animals and their products. There is a serious, though lesser risk, from persons who have been in contact with the disease or materials that have been contaminated and vehicles that have been used for the transport of such animals, products or materials. By contrast, a low and sometimes negligible risk is associated with non susceptible animals (such as dogs and horses under proper control and not in contact with susceptible animals), vehicles that are not used for carrying susceptible livestock or materials that might be contaminated, and people from towns travelling through agricultural areas. There are other risks against which it is difficult to apply control procedures, such as the spread of virus by wind but we are sure that a knowledge of such factors can assist in defining rational control measures.'

The main recommendations and suggestions relate to the need for more detailed pre-outbreak planning for the mobilization of manpower and equipment to deal with an outbreak wherever it may occur; to provide for the

swift and effective mobilization of manpower and resources including an epidemiological team and for smooth expansion to deal with outbreaks no matter what dimensions they assume.

It is difficult in an article of this length to go into the details of the conclusions of the Committee, but broadly speaking there are five types of recommendation in the report. Forty recommendations deal with infected and controlled areas, including restrictions on animals, products, vehicles and people, twenty-four prescribe precautions and safeguards concerning carcase disposal, disinfection and swill handling, sixteen deal with compensation and ten recommendations concern communications. The remaining fifteen deal with a number of miscellaneous matters such as reporting and diagnosis of disease and recruitment of veterinary staff.

After due consideration, the Committee recommended that voluntary vaccination should not be permitted in Great Britain but should it become necessary to apply ring vaccination, certain categories of animals such as zoo animals, herds of wild cattle and valuable pedigree livestock in close proximity to a vaccination area, might be included in the vaccination programme.

The vast majority of the Committee's recommendations have been accepted by the Minister of Agriculture and Secretary of State for Scotland. Fifty-one recommendations have already been implemented which affect pre-outbreak planning and the controls which would be needed in the event of an outbreak of disease. Nineteen were covered by amendments to existing legislation and the other thirty-two recommendations have already been implemented by internal administrative action. Another forty-eight recommendations have been accepted for early implementation leaving only six recommendations which call for further consideration either because they warrant consultation with other interests or because Ministers require to give further consideration to them.

When the main recommendations accepted have been implemented, a further article will be published to explain in more detail how the changes in the arrangements for preventing and dealing with the disease affect the farmer himself.

FARM SAFETY

There were 115 fatal accidents on farms in England and Wales in 1969, one more than in 1968. Since 1956, there have been 1,600 deaths in agriculture in England and Wales.

Overturning tractors. This remained the principal cause of death; 32 people died in overturning accidents, bringing the total since 1956 to 464. This figure would have been higher but for the protection afforded by tractor safety cabs.

Electrocution. Four of these deaths were caused by faulty wiring and one by damaged and unsafe equipment.

Children. There were 17 fatal accidents involving children under the age of 15 years, one more than in 1968. Four of these young people were among those killed in tractor-overturning accidents and five were run over by trailers, three of them after falling from the trailers. Three were drowned; two suffocated—one in a grain pit, the other beneath sacks of onions; one got caught in a drive shaft. One child died of tetanus after treading on a nail.

33. Northumberland (Rothbury and Bellingham)

J. B. Dakers

THE Rothbury Bellingham district is bounded in the north by the Scottish border and Cheviot hills, to the west by the Cumberland border and to the south reaches a section of the Roman Wall near Housesteads. The eastern march* is less well defined geographically, but runs to within ten miles of Alnwick before turning south and west to form an area approximately rectangular in shape and 360,000 acres in extent.

Historically, the district is better known as Coquetdale, Risdale and North Tynedale, and is rich in hill forts, Roman antiquities, castles and Pele towers†, indicating its wild and bloody history from before the Roman occupation to the more recent border raiding by Reivers and Moss Troopers.

Several packs of foxhounds hunt regularly, whilst beagling and coursing have a small but enthusiastic following. The Coquet in particular, and the North Tyne, are famous rivers for both salmon and trout.

The hiker who seeks the solitude of the country can find few areas in England more satisfying, either on one of the numerous drove roads across the Cheviots into Scotland or on the Pennine Way snaking south to Derbyshire. Tourists have only recently discovered the beauty and tranquility of the area and their numbers are steadily growing. It is, however, doubtful if the countryside in this district will become overcrowded, such is its size, the scarcity of hotels, and the natural limitations imposed on campers and caravanners by the large and voracious midges particularly common in the Kielder area.

Including much of the Cheviots, which rise to 2,600 ft, and vast areas of open hill and moorland and with an average elevation of 500 ft, the district is, in the main, a livestock rearing area with only 12 per cent of the crops and grass acreage under the plough. Milk production is limited to about thirty holdings, mostly small in scale.

The rainfall ranges from 30 to 35 in. per annum in the east to 50 in. on the hills and high moors. The winters tend to be long, though there is no ice cap as many southerners imagine! In recent years spring has been late and many stockmen can tell of feeding hay to cattle in early June and then harvesting hay in mid-July! Snowfalls can be heavy and many of the higher hill farms need to be prepared for a period of isolation during the winter months.

Farm size is considerably greater than the national figure, except in the far west where much of the land has been afforested, leaving many non-viable holdings. The average farm size is 600 acres of in-bye and rough grazings and many exceed 1,000 acres.

*Border
†Fortified dwelling

For convenience, although the divisions are far from precise, the district can be divided into four parts. In the east around Rothbury are a few farms more typical of the east of the country. Varying in size from 200 to 600 acres they have substantial acreages in cereals, principally barley, mainly for use in fattening home and purchased suckler calves and feeding breeding ewes. Livestock consists of large herds of cross Irish cows (100–150 are quite common), crossed with Hereford and Angus bulls, and flocks of Half-bred*, Cheviot or Mule† ewes for the production of fat and store lambs. Rothbury mart is a famous centre for store lambs; competition to top the market is keen and no doubt leads to the liberal use of the feed bag!

To the west and north the 'white' Cheviot hills meet the 'black' moors of Rochester and Ottercops in the heart of Redesdale. Here, hill sheep reign supreme. Blackface, Swaledales and Cheviots are bred pure for store lamb production—although more are now fattened wherever possible on hay foggs—and on the more hospitable farms, draft ewes are crossed to produce Mules and Half-breds for sale to marginal and lowland fat lamb producers. In the Cheviots, cattle are few and far between, not favouring the steep-sided and thin-soiled hills. In Redesdale suckler herds are found wherever the in-bye acreage is sufficient to produce hay for both cattle and sheep. These are, in the main, the hardier breeds of cows such as the Galloway and Blue Grey‡, although Hereford and Angus Cross Irish cows are becoming more common.

The latest in the chain of Experimental Husbandry Farms of the N.A.A.S. is situated in Redesdale and will play an important role in the future of hill farming in the locality and the North Pennine area.

South of the Coquet lies an area of marginal livestock rearing farms ranging from 300 to 1,000 acres in extent, with a good proportion of in-bye land and carrying Mule and draft hill ewes for the production of fat lambs and breeding stock. Large herds of Galloway or Irish cows are maintained, all progeny being sold at the autumn sales, principally at Scots Gap mart which, although just outside the district, is a focal point for this area.

As one travels further west to the North Tyne Valley and its hinterland, farm size falls rapidly. Sheep and cattle breeds are similar to those found in the rest of the district although herd and flock sizes are considerably smaller. Milk production though not widespread is more common. Near the forests lie many farms of less than 50 acres and amalgamations are in progress.

It is in this area of the North Tyne west of Wark and Bellingham, that forestry has had its greatest influence. Wark, Kielder and Redesdale forests stretch in an almost unbroken mass along the Cumberland border. Kielder is claimed to be the largest man-made forest in Europe with 40,000 acres in trees. In all, conifers cover 100,000 acres of the district.

This article gives only a brief indication of the beauty and agricultural capacity of this area which is dominated by the large-scale livestock rearing farms. But it would be an injustice to conclude without reference to the skill and dedication of the shepherds and stockmen.

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*Border/Leicester cross Cheviot ewe

†Hexham Blue-faced Leicester cross Swaledale or Blackface ewe

‡Whitebred Shorthorn cross Galloway cow

Where Insulation Pays

A. F. Culley, *Agricultural Land Service, Maidstone*

THE use of insulation against heat transmission has extended very considerably. It is easy to incorporate and has increased in popularity but, in some instances, its value is wasted as the conditions in which it should be used have not been fully recognized. To identify the worthwhileness of insulation, it is first necessary to appreciate what it achieves and then compare its effective use with its cost.

Materials

All materials have thermal-conductivity but vary considerably, depending on their thickness and density, in the way they transfer heat from the warm to the cold side. Today there are many manufactured and proprietary forms of insulated material that can be incorporated for use in roofs and walls. These are derived from mineral wools, glass fibres, wood-wool, compressed straw, polystyrene, polyurethene and other manufactured products. They can come in the form of boards, sheets, slabs, blankets or mats. Their costs vary considerably and some require supporting skins, others are sufficiently rigid in themselves and this affects fixing costs. Most insulating materials depend on the cavities or cells enclosed within them to achieve the insulation and there is a need for vapour sealing to prevent the passage of moisture into and through the material. Vapour sealing is normally fixed on the main side of the insulation. Some insulating materials are in the form of foams and sprays that can be applied to internal surfaces—sometimes presenting a problem of vapour sealing and, in some cases, a fire risk.

'U' values

Required levels of insulation of various buildings are expressed in terms of the 'U' value of roofs, walls and floors. This term means the number of British Thermal Units passing each hour through 1 sq. ft of the material or structure, for each degree Fahrenheit difference in air temperature between the inside and the outside of the building. The lower the 'U' value, the better is the insulation. For example, structures with a 'U' value of 0·1 would allow only a third of the heat to pass through in a given time compared with those with a 'U' value of 0·3, or the same heat loss would take three times longer. Insulation is provided for the safe and prolonged storage of certain produce; to give good working conditions for human comfort and efficiency; and for a better or controlled environment for certain classes of livestock. Special buildings, such as mushroom growing sheds or pear ripening rooms, have to be designed to cope with special temperatures and humidity.

Storage buildings

Insulation for storage is provided to keep frost out where produce would otherwise be damaged, or to maintain a low temperature usually mechanically produced for the storage of fruit, salad crops, vegetables and flowers. Potato stores in more exposed areas usually require insulated walls and roof giving 0·2 'U' value. Lining walls with 2 in. of wood-wool slab rendered, or cladding of sandwich construction incorporating 1 in. of glass fibre similar to that used in the roof, prevents frost striking through, and is preferable to the use of straw bales as it is space saving although it adds to building costs. In the case of fruit stores and other buildings requiring refrigeration to enable the produce to be preserved in good order for varying periods, insulation is essential. Various temperatures are needed for storage purposes. For example, pears require 30°F (−1·1°C) or above, dessert apples say 37°F (2·8°C), whereas shorter term storage of other produce can operate at 40–42°F (4·4–5·6°C). The demand on refrigeration plants is reduced by a low 'U' value of the structure leading to more economic running, avoidance of moisture loss and icing up. The stores must be sealed to avoid air leaks and the insulation must be kept dry by vapour seals. Atmosphere controlled refrigerated stores for pears and apples require a 'U' value of not more than 0·07 for walls and ceiling and this is usually achieved by not less than 3 in. of polystrene. Where, because of the construction, there are through timbers or other materials of greater thermal conductivity, the insulating material has to be thickened to keep the 'U' value at the correct level. At the lower temperature floors should be insulated to a 'U' value of 0·16 and reinforced to avoid crushing the insulation material. Increasing use is made of refrigerated and cold stores for storing many items—not only bulbs but vegetable and salad crops, flowers and even plants, such as strawberry runners—to ensure that they are held at the right stage ready for planting at the right time.

Work places

Produce that requires sorting, grading and packing for its dispatch off the farm entails the employment of a good deal of labour. Such workers stand or sit for long periods and the maintenance of a reasonable temperature in their workplace enables them to work with their hands and arms freely and efficiently. Packhouses are, therefore, almost now universally provided with insulation of roof and walls together with some from of artificial heating. This would be excessively expensive if there were no insulation to retain the heat within the building, bearing in mind also the air changes that take place from ventilation and the opening and shutting of doors.

Workshops clearly justify insulation and often have some form of artificial heating and a 'U' value of 0·2 for the roof and walls is usually sufficient. This can be provided by either a sandwich construction roof or by an insulated ceiling, with the walls lined with insulating material or sandwich construction cladding. Prefabricated insulated wall panelling has been introduced but has not yet become attractive enough in cost to be universally adopted. It is usual to damp-proof the floors of packhouses and workshops but not to insulate them. Floor coverings are generally more effective and are provided in the places where workers stand, by the provision of, for example, ½ in. fibrous insulating board which can be regarded as expendable.

Livestock buildings

Such buildings should be insulated to ensure a good atmosphere and a reasonable temperature at a fairly even level in relation to the fluctuating temperatures outside, e.g., as for piggeries, poultry houses and, in many instances, calf pens. The maintenance of the proper temperatures inside the building, often with the assistance of artificial heating accompanied by appropriate air changes, is really only possible by minimizing heat loss of the structure with 'U' value of between 0·1 and 0·2. The effect of a warmed atmosphere—provided either artificially or by the animals themselves—upon the inside surfaces of uninsulated roofs and walls is easily seen by the amount of condensation that can occur, particularly when the ambient temperature is low. Sometimes temperatures in a building are kept up by reducing ventilation—when the bad atmosphere full of ammonia and high humidity created is easily discernible. What is clear is that in these specialist livestock buildings, insulation is a positive factor in providing the right conditions for housing the animals or birds from the point of view of health, performance, economy of food and their general well-being. There is a distinct relationship between insulation, ventilation and warmth. Wherever animals lie, insulated bedded areas can be incorporated in the floor construction as an alternative to the use of straw which is a running cost to compare with an increased capital cost.

General

Insulation adds from 10 to 20 per cent to the cost of the building. It is usually easier and cheaper to incorporate it at the construction stage; and, although it is possible to add insulation later, it is usually less effective. The cost of incorporating insulation can be established and measured against the advantages that insulation can bring. Adequate insulation, while adding to initial building costs, reduces annual running costs wherever a particular environment must be created.

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books received

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in brief

- **Conservation and the farmer**
- **Uncertainty in the milking parlour**
- **Measuring grass production**

Conservation and the farmer

THE old adage 'As you make your bed, so you must lie on it' has never been illustrated more graphically than in man's relationship to his environment; and much of environment today is under constant attack from the resulting pressures of feeding, housing and servicing increasing populations. It is imperative, therefore, that we should stop and take a critical look at this 'bed-making' operation before we and those who come after us are required to get into it. For this reason the examination of the problem by twenty-one European countries this year, and the lessons we can learn from it, are of literally vital importance.

Pre-eminently, the countryside is the workshop of farming and must continue to play a major role in Britain's economy, with its sights set on expanding food production and import saving. And here, as in other spheres, scientific and technological advances must not be strait-jacketed if the impressive record of our agricultural productivity is to continue to scale new heights. The country expects that farmers will do their job every bit as efficiently as their competitors abroad—if not more so.

The answer, of course, lies in reciprocal understanding between those who fear man's pollution of his environment and its far-reaching consequences, and those who must adopt new techniques to offset modern economic constraints. In point of fact their interests are identical. Farmers can do much to preserve wild life by creating new habitats in unused corners, sparing hedgerows and spinneys wherever possible, and seeing in their scrubland and uneconomic areas of wet land sanctuaries that are so urgently needed. The use of chemicals, which has now entered into practically every aspect of farming, should be tempered by discretion, in the same way that the Government schemes control their introduction and use and the unflagging research of the manufacturers continues to seek safer, less persistent and more specific formulations. Farm buildings could often be planned and sited to lie in harmony with their surroundings, and landowners and foresters have special opportunities (already well demonstrated by the Forestry Commission) of contributing their imagination and skill both in improving landscape amenity and encouraging wild life.

But the farmer also has a point of view—which is not to say that he is not also a conservationist. With the countryside now on everybody's 'doorstep' and being opened up to the leisure of townsfolk, his property, crops and stock must be seen as not inviting thoughtless invasion, nor his fields as sites for the dumping of picnic refuse and unwanted domestic bric-à-brac or as exercise grounds for dogs.

Britain is a small country—there are less than three-quarters of an acre per person for all purposes—and therefore we cannot afford the loss or pollution of our national resources. There is no real clash of interests between conservationists and 'the others'; only a need for an open mind. The Minister of Agriculture's suggestion that Agricultural Executive Committees in each county might take the initiative by bringing together representatives of farming and conservation interests, perhaps by forming a group in every county, would certainly generate the right kind of climate. A series of regional demonstrations and conferences is also being planned. 'Conservation is a task for all of the people all of the time', said Mr. Cledwyn Hughes at an inaugural one-day conference, which succinctly defines the area of concern and the degree of collaboration.

Uncertainty in the milking parlour

FIGURES given in the Report of the Breeding and Production Organization of the M.M.B. for 1968–69* point to the importance of regular annual servicing of milking machines. Commenting on a survey covering a hundred farms which have had a second test in this period, the highest number of faults are said to have been found in the vacuum controller (32%), with pulsators and relays (22%) and vacuum pumps (15%) in second and third place. *New* faults discovered at the second test appeared predominantly in the sanitary trap, the milk pump releasers (both 100%), the rubberware, the units themselves and the vacuum line.

Summarily, the figures reveal not only that nearly nine out of ten milking plants had at least one fault at the time of the first test and that this proportion had been reduced to seven out of ten by the second test, but that during the year nearly four out of ten plants had developed at least one new fault.

The three-year-old Milk Machine Testing Service now numbers some 7,000 members, plus 3,550 in Low Cost Production, who get the test as part of the service —totalling approximately 12 per cent of all producers. This immediately raises the question of the standard of milking machine performance among the other 88 per cent. In how many milking parlours up and down the country are there daily vexations, loss of time and temper—and milk—attributable directly to a lack of good maintenance?

A once-a-year complete test of the milking machine installation is clearly a worthwhile piece of insurance, and the service provided by the M.M.B. at £4 15*s.* per test should be seen in that light. It should be unnecessary to add that correction of the faults found should follow promptly on diagnosis, but in the Board's experience a high proportion are indeed left to deteriorate still further. This is to ignore the fact that when the uncertainty of ageing equipment hangs over the milking parlour, profits can leak out down the drain.

Measuring grass production

EVERY farmer knows that certain of his pastures are better than others, but not necessarily how much better. Intuitive knowledge is all very well in its way, but facts and figures are an incomparably better guide and indeed are essential to accurate farm budgeting. Other crops can readily be measured in terms of yield, but assessing the ultimate value of grass is complicated by a number of variable factors—the composition of the sward, the grazing/cutting pattern, the efficiency of animal conversion into milk or flesh, and the rate and age of stocking are only some of them. To cover every facet would be a job best handed over to a computer. Nevertheless, as reasonable a figure as possible should be put to it if the costing of the enterprise of which it forms a part is not to be disguised.

The beginning of the grassland year affords both the incentive and the opportunity of measuring grass production, and your local N.A.A.S. officer will be only too pleased to suggest the best way of going about it.

AGRIC

*Price 12*s.* 6*d.* from the Milk Marketing Board, Thames Ditton, Surrey.

Books

Reclamation and Cultivation of Peat-Bog Soils. S. G. SKOROPANOV. H. A. Humphrey, 1968. 90*s*. [£4·50].

It is estimated that the total world reserves of peat is 261 billion tons of which 60 per cent lies within the U.S.S.R. The author is associated with the Minsk Experimental Bog Station, established in 1911 and since renamed the Belorussian Research Institute of Melioration and Water Management. From 1911 to 1917 the Minsk Station succeeded in the reclamation of only seventy-five acres of peat-bog soils. After the revolution the Soviets lent real impetus to research and its practical application to reclamation and soil amelioration schemes. The area of peat-bog soils reclaimed and developed now exceeds twenty million acres.

The historical aspect of the problem in various parts of Europe is covered, starting with the old burning-off system recorded by our own Admiral Lord Orford in his voyage through the English fens in 1780. Also two methods of top-dressing with mineral earth (clay or sand) so typical of the earlier reclamation work in the Netherlands. The English system of drainage and immediate cropping of the virgin peat has proved to be the most economically viable method of covering the capital costs.

Considerable attention is focused on the origin and classification of peat-bog soils formed either by the overgrowing of ponded areas, or by the bogging of raised areas within high rainfall or humidity conditions. The raised peats are the more acid with high moisture holding capacity. They are also poor in nitrogen and of very low phosphorus and potassium content. Conversely, lower or basin peats have a higher ash content, being considerably richer in calcium and the other major elements due, in the main, to mineral earth admixtures deposited by flood waters especially in river flood plains. Reference is also made to low copper content.

The hydrophysical properties of drained peat-bogs, chiefly compaction and mineralization, change considerably following the initial extraction of groundwater. Measurements of CO_2 emission and of nitrate nitrogen revealed the highest intensity of biological activity in soils intensively cropped with arable crops and less so in an arable-grass rotation. This suggests that the decomposition of organic matter and its accumulation in the land lend themselves to practical regulation: a pious hope in Russia but a practical impossibility in the English fens.

Nicholson's work on Burwell Fen on groundwater (water-table) levels relative to crop needs is confirmed in experiments showing that groundwater levels should be lowered to a minimum of 75—80 cm by sowing time with provision for a lower descent to 110—120 cm from the soil surface during the active vegetative season. Dykes only have proved to be inadequate for the efficient easement of excess groundwater from peat soils and, in the long term, tile drainage is essential.

To wastage, a major problem in Britain, there are many references but on the assumption that Soviet cropping will demand no more than 22–25 per cent of area to arable cash crops, 25–30 per cent grain crops and the remaining 50 per cent to perennial grasses, there seems to be no immediate concern over the possibility of rapid decay. However, reference is made to what is happening to highly-tilled peatlands in other parts of the world!

Crop yield data features in many of the 172 tables but these are annoying and exasperating as without title headings and sub-titles one was committed to re-reading the text to memorize what the tables purported to show. Of the 482 biographical references 27 are from Skoropanov. The translation should prove of value and interest to those in parts of the world where virgin peat bogs have yet to be dealt with, also to students working on peatland agronomy.

P.E.C.

Research, Education and Extension in Agriculture. J. ASHTON and R. F. LORD. Oliver and Boyd, 1969. 30*s*. [£1·50].

This book deals with a conference, arranged by the Agricultural Adjustment Unit of Newcastle upon Tyne University, to critically review the present functioning of research, education and advisory work in British agriculture.

Looking towards possible lines of development in what has become a highly capitalized industry working at an advanced level of technology, the authors, in an introductory paper, stress the need for long-term and flexible planning. This would have to take into account the wide variation between farmers: the progressive ones with adequate capital and others not so equipped. Changes in farm techniques may, they point out, call for considerable change in policy among workers concerned with research, education and extension in agriculture.

At this exploratory stage it was not intended that the conference should make specific recommendations, but the conference papers and discussions contain many observations which reveal new lines of thinking. To mention only a few: the need for a better balance between research and development, especially that carried out by private firms; the advantages of concentrating teaching resources at few instead of at most universities; the need to make a survey of the number of agricultural workers in relation to their educational standards. They also criticize the high proportion of research effort in the pursuit of knowledge, more of which might be devoted to problems nearer home; uneasiness about the confidential nature of N.A.A.S. records which withholds valuable data from research workers aiming to assess the effectiveness of extension methods; the merits and demerits of the group approach in advisory work; the need to avoid 'entrenched traditionalism' at all costs.

Two appendices, one on the role of the farm institute and the other tracing the careers of some agricultural graduates, are included.

A.J.L.L.

Land Use Capability Survey Handbook. WATER AND SOIL CONSERVATION, Ministry of Works. N.Z. 1969. Estimated price approx. $2·50 N.Z.

The Water and Soil Division, Ministry of Works, Wellington have produced for the New Zealand Soil Conservation and Rivers Control Council a 'nuggety' well-illustrated, well-written, concise pocket handbook of 138 pages on land use capability and classification in New Zealand; it is contained in robust covers, easily expanded, with an excellent glossary and adequate references. It provides a working guide for soil conservators and others, who record facts about land or classify it, to assess its potential for improved systems of land use within its physical limitations.

The book is, however, more than a code of practice; for 'the Soil Conservation and Rivers Control Council will require strict adherence to standards, as laid down in this handbook, for land inventory compilation and land use capability classification in the future'; not only so but 'it is on these (standards) that the Council's assistance to farmers is based'. While those responsible for publishing the handbook pay generous tribute to U.S.D.A. publications on such matters, this in no way detracts from its autochthonous independence and lucidity.

One thinks of New Zealand as a land of milk, mutton, mountains and Maoris, but the ruminant cloven hoof, the axe, firestick, and land misuse could, if uncontrolled, produce another situation which could end in dustbowls and dereliction. Parts of East Anglia and some Fen districts may, therefore, merit the attention of our conservators!

The handbook is printed by the Government Printer, Wellington and is worthy of a place on many bookshelves and in the pockets of practical soil conservators.

J.K.

Root Growth. (Proceedings of the Fifteenth Easter School in Agricultural Science, University of Nottingham, 1968.) Edited by W. J. WHITTINGTON. Butterworths, 1969. Eight guineas. [£8·40].

This collection of papers is broadly divided into three parts; structure and general physiology, function and response to environment, environment and growth. There is also a detailed account of the root observation laboratories at East Malling and descriptions of the demonstrations shown at the meeting. Where about thirty contributors and many more members specializing in different aspects of root growth (anatomy, physiology, genetics, agronomy, theoretical and applied) come together, it is important they should be easily intelligible to one another and, because of this, one of the merits of the book is that all biologists and agriculturists can read it and be rewarded. It is, in fact, a useful blend giving sufficient detail to think over and, at the same time, presenting reviews on different topics and conclusions based on recent work.

Nevertheless, as one might expect, it is primarily a book on the physiology of root growth and most aspects are dealt with, the interrelation of root and shoot, water relations, soil relations, root initiation in cut-

tings, root development in isolated root cultures, and so on. For the most part the book will be just as stimulating to those more used to looking at the tops of plants as to those directly concerned with the roots, and they will inevitably begin to review their own work and observations in relation to some of the findings here.

Can genetic differences in root growth between varieties of cereals and grasses be made use of in mixed crops? To what extent can populations of micro-organisms, which abound both around and within roots and certainly affect plant growth, be controlled to improve crop yield? Not all the answers are given; in all aspects there is need for more research and this compact volume records the progress made, and indicates where future advances are likely to occur.

A.D.

The Rural Landscape of the East Riding of Yorkshire 1700–1850. ALAN HARRIS. S.R. Publishers, 1969. 42*s*. [£2·10].

It is not surprising that there should have been a demand for a reprint of this popular survey of one of the most striking periods of agrarian development. Written in easily readable form, it provides a fascinating account of the spectacular changes which took place during the formative years of what is now one of the most important arable farming areas in England, and relates these changes to geographical features. The book should appeal to all who have an interest in the making of our countryside, whilst the serious student will find it an invaluable aid, for one of its features is its wealth of references to sources of information from which the author has drawn his material.

Although Holderness and the Vale of York are not neglected, especially as far as the important drainage improvements of the period are concerned, the changes in these districts of earlier inclosure were less striking than on the Yorkshire Wolds at that time. It is, therefore, only natural that the author should have given his greatest attention to the lansdscape of the Wolds.

The reader cannot fail to draw comparisons between the developments there between 1750 and 1850 and the present time. Despite the fundamental differences which the internal combustion engine has made to the agricultural and social structure of the area, he will be impressed by the similarities which he finds. Certainly, he will be conscious of how much the present-day pattern of Wold farming owes to the inclosers and improvers of a century and a half ago.

A.M.S.

Nature Conservation in Britain. DUDLEY STAMP. Collins, 1969. 36*s*. [£1·80].

This review of conservation, from the late nineteenth century to the present day, was Sir Dudley Stamp's last work before he died in August, 1966. It is also a review of The New Naturalist series and his fellow editors saw the book through the press. The series was planned during the war of 1939–45 and, like the Scott Committee on *Land Utilisation in Rural Areas* (of which Stamp was vice-chairman and Thomas Sharp and Basil Engholm the two secretaries), was an act of faith in the future.

As a geographer-cum-natural historian in the broadest sense, Stamp was not only impressed by Britain's complex geological history and the unique range of environmental conditions in so small an area, but also by the population density of 812 per square mile in England and Wales (0·79 acre per head), or nearly 600 per square mile for the whole of Britain (1·08 acre per head); by comparison the United States has about 12 acres per head.

Tribute is paid to the early preservationist societies (*Commons, Open Spaces and Footpaths*, 1865; *Protection of Birds*, 1889) and to the *Society for the Promotion of Nature Reserves*, 1912, which now represents all the County Naturalists' Trusts at national level.

It is accepted that our countryside is not 'natural' but a particular stage in the evolution of a pattern of land-use; that land management is applied ecology and that the Agriculture Act of 1947 revolutionized the whole concept of farming. Full acknowledgment is made to the work of the Nature Conservancy, with which Stamp was so closely associated and an optimistic view taken about collaboration between diverse interests.

The field is so immense that there are, inevitably, some errors of fact and imputation, but the author's scholarship avoids superficiality. There is a good general bibliography and particularly useful appendices, compiled by James Fisher, listing organizations concerned with conservation and, by counties, nature reserves, arboreta, zoological gardens, forest parks and allied areas.

H.V.T.

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Correction

AZIPROTRYNE (page 56 of the 1970 List)

The **Limitations** apply only to cabbage and Brussels sprouts, not peas.

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Tel: Wisbech 2991-4

Mirfield Agricultural Chemicals Ltd.,
P.O. Box No. 1,
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Tel: Mirfield 3861-6

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FISHERIES AND FOOD

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